

Comparison of Functional Outcome of Austin Moore Hemiarthroplasty VS Bipolar Hemiarthroplasty in Transcervical Femoral Neck Fractures in Elderly Population

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ABSTRACT

Introduction: The most popular treatment for misplaced femoral neck fracture in the elderly is hemiarthroplasty. Unipolar and bipolar implants are the two types used in hemiarthroplasty. Different prostheses, such as Austin Moore, Thompson, and Bipolar prostheses, are employed based on the patient's mobility, neck, and bone stock in the medial buttress. Theoretically, bipolar prostheses prevent acetabular erosion by shifting weight to the inner bearing of the prosthesis, which in turn lessens the interaction between the prosthesis and acetabulum.

Methodology: This cohort study was conducted by the orthopedic surgery department of Allied Hospital Faisalabad between January and June of 2025. Patients of both sexes with femur neck fractures of Garden Type III and Garden Type IV who were between the ages of 50 and 70 were included. Patients with pathological fractures, those medically ineligible for surgery, those with bilateral femur neck fractures, those who had undergone surgery on both the same and opposite sides, and nonambulators were excluded. Patients were divided into two groups, Austin Moore hemiarthroplasty was done on patients in group A, while bipolar hemiarthroplasty was performed on patients in group B. The Harris Hip Score was used to determine the functional outcome both before and after surgery. It was determined weekly for the first four weeks, then every two weeks for three months, and finally every month for six months. An HHS of 90 or higher was considered exceptional, 80 to 89 good, 70 to 79 fair, and less than 70 bad.

Results: The Harris hip scores for groups A and B in my study were 62.34 ± 7.32 and 63.42 ± 6.98 at baseline, respectively, and 89.43 ± 6.13 and 82.15 ± 7.45 at six months. 51.66% of patients in this study had outstanding treatment outcomes from Austin Moore Hemiarthroplasty, 32.23% had good outcomes, 10.43% had acceptable outcomes, and 5.69% had bad outcomes. 33.65% of patients who underwent bipolar hemiarthroplasty experienced outstanding results, 37.91% had good outcomes, 19.43% had fair outcomes, and 9.00% had bad outcomes.

Conclusion: This study found that treating transcervical femoral neck fractures in elderly population with Austin Moore Hemiarthroplasty results in a better functional outcome than with Bipolar hemiarthroplasty.

Keywords: Austin Moore Hemiarthroplasty; Bipolar Hemiarthroplasty; Femoral Neck Fractures; Harris Hip Score; Outcome,

Authors' Contribution:

^{1,2}Conception; Literature research; manuscript design and drafting; ^{2,3}Critical analysis and manuscript review; ^{3,4}Data analysis; Manuscript Editing.

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Introduction

Orthopaedic surgeons have long faced significant difficulties with femoral neck fractures, one of the most frequent injuries among the elderly.

Additionally, following the fifth decade of life, the fracture's prevalence doubles with each decade.¹ For females, the chance of femoral neck fracture [FNF] is approximately 40-50%, while for males, it is

13-22%. Historically, orthopedic surgeons have faced significant hurdles due to FNF. Improvements in life expectancy, osteoporosis, impaired vision, neuro-muscular incoordination, and changes in lifestyle that result in sedentary habits have all contributed to an increase in the prevalence of these fractures.² Injury is mostly caused by low energy falls. Rarely, there is no history of trauma, and the fracture may be pathologic or stress-related. Numerous co-morbid illnesses, including diabetes, heart issues, and hypertension, are linked to them.³ Closed reduction and fixation or complete prosthesis replacement are the available treatment options. According to experience, the patient's pre-injury condition, and bony architectural alterations, the prosthetic replacement options include unipolar (Austin Moore/Thompson prosthesis) hemiarthroplasty, bipolar hemiarthroplasty, modular with hemiarthroplasty components, and complete hip arthroplasty.⁴

The most popular treatment for misplaced FNF in the elderly is hemiarthroplasty. Unipolar and bipolar implants are the two types used in hemiarthroplasty. Different prostheses, such as Austin Moore, Thompson, and Bipolar prostheses, are employed based on the patient's mobility, neck, and bone stock in the medial buttress. Theoretically, bipolar prostheses prevent acetabular erosion by shifting weight to the inner bearing of the prosthesis, which in turn lessens the interaction between the prosthesis and acetabulum.^{5,6}

Unipolar implants are frequently utilized as a therapeutic option for femoral neck fractures in nations like Pakistan. Therefore, our study's objective was to evaluate and contrast the functional outcomes of AMP and bipolar disorder. In the future, the method with the best functional results will be suggested.

Methodology

This cohort study was conducted by the orthopedic surgery department of Allied Hospital Faisalabad

between January and June of 2025. Using the WHO sample size calculator, the sample size was determined to be 422 (211 in each group), with the following parameters: Level of significance = 5%, Power of test = 80%, and Anticipated proportion in group A = 10.6%² and Anticipated proportion in group B = 3.6%.⁶ Patients of both sexes with femur neck fractures of Garden Type III and Garden Type IV who were between the ages of 50 and 70 were included. Patients with pathological fractures, those medically ineligible for surgery, those with bilateral femur neck fractures, those who had undergone surgery on both the same and opposite sides, and nonambulators were excluded.

Before being included in the study, each participant gave their informed consent after being informed of its goals and assured of the confidentiality of the data. In accordance with the inclusion criteria, patients were chosen. Each patient's age, sex, and co-morbidities (diabetes mellitus, osteoarthritis of the knee, cerebrovascular accident) were recorded, as were the specifics of their investigations (X-ray knee AP/ Lateral, pre and post operation hip x-rays with femur AP & Lateral views). Patients were split into two groups. Austin Moore hemiarthroplasty was performed on patients in group A, while bipolar hemiarthroplasty was performed on patients in group B. Every operation was carried out by a skilled orthopaedic surgeon. Every patient underwent surgery according to the same standard protocol. Both hemiarthroplasties were performed using Moore's method. The Austin Moore prosthesis was forced into place, and the bipolar prosthesis was secured with bone cement. The suction drain was used to seal the wounds. On the first post-operative day, patients began active and passive limb exercises under the guidance of a physiotherapist. On the fourth or fifth post-operative day, patients have discharged home. The Harris Hip Score was used to determine the functional outcome both before and after surgery. It was determined weekly for the first four weeks, then every two weeks for three months, and finally every month for six months. An HHS of

90 or higher was considered exceptional, 80 to 89 good, 70 to 79 fair, and less than 70 bad. Custom created proforma was used to record all of the data. The analysis of the data was done with SPSS version 25.0. The mean $\pm$ standard deviation was used to characterize quantitative characteristics such as age, height, weight, BMI, fracture duration, and Harris Hip score. Age, gender, laterality, fracture origin, garden type, and functional result are examples of categorical factors. The functional outcomes of the two groups were compared using the chi-square test. P values below 0.05 were regarded as significant.

Ethical approval was taken from the ethical review committee of Sargodha Medical College, Sargodha Sargodha (Ref. 1273/SMC/ERC-2025)

Results

The study's participants ranged in age from 50 to 70, with a mean age of 62.29 ± 6.81 years. According to

Table I, the mean age of the patients in groups A and B was 62.19 ± 7.15 and 62.40 ± 6.54 years, respectively.

In a 1:1.2 ratio, 228 (54.03%) of these 422 patients were female and 194 (45.97%) were male. Group B's mean BMI was 26.75 ± 8.56 kg/m², while group A's was 26.81 ± 9.33 kg/m². Table I displays the distribution of the various variables.

The Harris hip scores for groups A and B in my study were 62.34 ± 7.32 and 63.42 ± 6.98 at baseline, respectively, and 89.43 ± 6.13 and 82.15 ± 7.45 at six months (Table II). 51.66% of patients in this study had outstanding treatment outcomes from Austin Moore Hemiarthroplasty, 32.23% had good outcomes, 10.43% had acceptable outcomes, and 5.69% had bad outcomes. According to Table III, 33.65% of patients who underwent bipolar hemiarthroplasty experienced outstanding results, 37.91% had good outcomes, 19.43% had fair outcomes, and 9.00% had bad outcomes.

Table-I: Distribution of different variables (n=422).

		Group A (n=211)	Group B (n=211)
		Number (%)	Number (%)
Age (years)	50-60	87 (41.23%)	80 (37.91%)
	61-70	124 (58.77%)	131 (62.09%)
Gender	Male	95 (45.02%)	99 (46.92%)
	Female	116 (54.98%)	112 (53.08%)
Duration of fracture (weeks)	≤ 4	164 (77.73%)	156 (73.93%)
	> 4	47 (22.27%)	55 (26.07%)
BMI (kg/m ²)	≤ 30	89 (42.18%)	96 (45.50%)
	> 30	122 (57.82%)	115 (54.50%)
Laterality	Right	123 (58.29%)	118 (55.92%)
	Left	88 (41.71%)	93 (44.08%)
Cause	Slipping	85 (40.28%)	79 (37.44%)
	RTA	74 (35.07%)	82 (38.86%)
	Other	52 (24.64%)	50 (23.70%)
Garden type	III	152 (72.04%)	143 (67.77%)
	IV	59 (27.96%)	68 (32.23%)
Hypertension	Yes	113 (53.55%)	109 (51.66%)
	No	98 (46.45%)	102 (48.34%)
Diabetes mellitus	Yes	104 (49.29%)	99 (46.92%)
	No	107 (50.71%)	112 (53.08%)
COPD	Yes	35 (16.59%)	31 (14.69%)
	No	176 (83.41%)	180 (85.31%)
Knee osteoarthritis	Yes	78 (36.97%)	81 (38.39%)
	No	133 (63.03%)	130 (61.61%)

Table-II: Comparison of Harris hip score (n=422)			
	Group A (n=211)	Group B (n=211)	P-value
	Mean $\pm$ SD	Mean $\pm$ SD	
HHS at baseline	62.34 $\pm$ 7.32	63.42 $\pm$ 6.98	0.1216
HHS at 6 months	89.43 $\pm$ 6.13	82.15 $\pm$ 7.45	0.0001

Table III: Comparison of functional outcome between both Groups (n=86).							
		Group A (n=211)		Group B (n=211)		Chi square value	p-value
		Frequency	%age	Frequency	%age		
Outcome	Excellent	109	51.66	71	33.65	16.31	0.001
	Good	68	32.23	80	37.91		
	Fair	22	10.43	41	19.43		
	Poor	12	5.69	19	9.00		

Discussion

Globally, the number of elderly people is rising, and femur neck fractures are now a major public health issue.⁷ Arthroplasty is the preferred treatment for an elderly patient with a displaced fracture of the femoral neck, according to strong, recent data from RCTs.⁸ A hemiarthroplasty is a technique in which a prosthesis is used to replace the femur's head and neck without altering the acetabulum. Both unipolar and bipolar articulations of the prosthesis and the patient's acetabulum are possible when utilizing a HA.⁹⁻¹³ It is controversial to choose a prosthesis in HA.¹⁴

The study's participants ranged in age from 50 to 70, with a mean age of 62.29 $\pm$ 6.81 years. Patients in groups A and B had mean ages of 62.19 $\pm$ 7.15 and 62.40 $\pm$ 6.54 years, respectively. Femur neck fractures are more common in older women. Several series have reported a female preponderance. Carl Johan Hedbeck⁷ 76%, Bhushan MS¹⁵ 78.5%, and John E. Kenzora¹⁶ 77.4%. Generally speaking, male patients with femur neck fractures are younger than female patients. The majority of participants in our study were female (65.8%).¹⁷

The average surgical delay in our study was 51 days, with a range of 5 to 344 days. Economic issues,

ignored patients, and late hospital presentations were probably the main causes of the delays. Every patient in the bipolar and unipolar groups underwent late surgery. The unipolar and bipolar groups experienced mean surgical delays of 11 and 13.87 days, respectively. In the 2020 study by Antoni et al., the average time from injury to surgery was 5.6 days, with a range of 2 to 14 days.¹⁸ Both the outcomes of the clinical function grading using the Salvati Wilson Score and the timing of the surgery were significantly correlated with either the pain score or the clinical function score.¹⁹ After hemiarthroplasty surgery, walking issues are particularly likely to occur in older patients with weaker muscles.²⁰⁻²² Hemiarthroplasty should not be condemned because of pain after the treatment.²³ The following factors can cause pain: periarticular ossification, contractures, acetabular or toggle wandering, metallic corrosion and tissue reactivity, infection, inappropriate prosthetic seating, and redundant ligamentum teres.²⁴ The Harris hip scores for groups A and B in my study were 62.34 $\pm$ 7.32 and 63.42 $\pm$ 6.98 at baseline, respectively, and 89.43 $\pm$ 6.13 and 82.15 $\pm$ 7.45 at six months. In this research, Austin Moore, 51.66% of patients who had hemiarthroplasty reported outstanding treatment

outcomes, 32.23% reported good outcomes, 10.43% reported acceptable outcomes, and 5.69% reported bad outcomes. Of the patients who underwent bipolar hemiarthroplasty, 33.65% had outstanding results, 37.91% had good results, 19.43% had fair results, and 9.00% had poor results. A study that assessed the functional outcome of bipolar hemiarthroplasty for intracapsular femur neck fractures found that 19 patients (28.78%) had excellent results, 25 patients (37.87%) had good results, 15 patients (22.72%) had fair results, and 7 patients (10.6%) had poor results². A study on Austin Moore hemiarthroplasty found that 15 patients (53.6%) had excellent results, 9 patients (32.1%) had fair results, and one patient (3.6%) had poor results.⁶ An analysis of 40 Austin Moore replacement cases with an average follow-up of 26 months that were performed for femoral neck fractures.²⁵ According to Silva et al. (2020), a limp was observed in 35 cases (87.5%) as a result of abductor muscle weakness, shortening, or pain.²⁶ After hemiarthroplasty, acetabular erosion typically starts three years later and seems to proceed steadily from that point on.²⁷ However, we were unable to identify any complications, including dislocation, in our study. Compared to unipolar patients, bipolar patients showed reduced rates of acetabular erosion and higher hip scores.²⁸ According to our research, the unipolar group's total modified Harris Hip Score is higher than that of the bipolar group. According to Austin-Moore HA's long-term results, at ten years of follow-up, 31% of patients had community ambulators, 35% had household ambulators, 4% had non-functional ambulators, and 30% did not have ambulators.²⁷ The best available evidence in the literature led to the conclusion that older patients with modest demand should only receive cemented, unipolar HA. Nevertheless, due to the comparatively low cost and favorable short-term results, Austin-Moore HA treatments are being used widely in inappropriate patients, which is increasing the incidence of unsuccessful surgeries.²⁸

There were no changes in the length of hospital stays, hip rating results, or postoperative complication rates between the two patient groups in a prospective investigation of the six-month follow-up of thirty-three bipolar and fifteen unipolar hemiarthroplasties. An eight-year retrospective assessment of ninety unipolar and forty-eight bipolar hemiarthroplasties indicated no statistically significant differences in mortality rates, surgical complications, or other events, including medical problems.²⁸

Conclusion

This study found that treating transcervical femoral neck fractures in elderly population with Austin Moore Hemiarthroplasty results in a better functional outcome than with Bipolar hemiarthroplasty. Therefore, we advise that the main approach for treating transcervical femoral neck fractures in elderly population should be Austin Moore Hemiarthroplasty; these particular individuals can be mobilized and returned to their regular life right away to minimize pain.

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