

## Original Research Article

# Hemiarthroplasty for intra-capsular fracture neck of femur in elderly patients: a prospective observational study

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## ABSTRACT

**Background:** Hip fractures in older patients are associated with impaired mobility, excess morbidity and mortality, and loss of independence. This study was aimed at evaluating the outcome of hemiarthroplasty, by assessing the quality of life and degree of function in the operated limb.

**Methods:** Out of 30 patients treated in this manner, all cases were available for follow-up period of 6 months. Patients of age 60 years and above, diagnosed with fracture neck of femur, were included in the study.

**Results:** Majority of patients belongs to age group 60-69 years was 56.7% Females were more common 56.7% than males in the present study. About 13.3% patients sustained the injury due to a fall from a height and 23.3% due to a road traffic accident. About 20 patients (60%) had a stay of less than 20 days in hospital. In our study Harris hip score, at end of six month ranged from 35 to 94.6. At final 6 months follow-up by Harris hip scoring system, 53.33% had excellent result, 33.33% had good results, 16.67% had fair results and 6.67% had poor results.

**Conclusions:** We conclude that hemiarthroplasty for fracture neck of femur is a good option in elderly patients. The mortality and morbidity are not high, operative procedure is simple, complications are less disabling. Early functional results are satisfactory.

**Keywords:** Fracture neck of femur, Intra-capsular, Hemiarthroplasty, Elderly, Harris hip score, Outcome

## INTRODUCTION

Femoral neck fractures are frequent injuries in the patient population of every trauma center and have a high incidence in the general population.<sup>1</sup> Hip fractures in older patients are associated with impaired mobility, excess morbidity and mortality, and loss of independence.<sup>2,3</sup>

Well recognised goals of surgical treatment are immediate pain relief, rapid mobilisation and ambulation, accelerated rehabilitation, and maintenance of independent living. In addition to these prerequisites, the ideal implant must be associated with a low risk of surgical complications and subsequent revision.<sup>3</sup> Reconstruction options include: hemiarthroplasty (HA) - unipolar and bipolar - and total hip arthroplasty (THA). Advantages of monopolar and bipolar arthroplasty compared to THA include short operation time and quick

mobilization of the patient.<sup>2</sup> Good or at least acceptable clinical, functional and radiological results have been reported in a wide array of studies.<sup>5-8</sup> However, whether unipolar or bipolar hemiarthroplasty (HA) provide better results is still under debate.<sup>9</sup>

In spite of all the developments in field of replacement surgery most surgeons still prefer to do hemiarthroplasty as primary procedure as it is always possible to do total hip replacement at a later date. This study was aimed at evaluating the outcome of hemiarthroplasty, by assessing the quality of life and degree of function in the operated limb.

## METHODS

The present prospective observational study includes 30 cases of intracapsular fracture neck of femur in elderly patients above the age of 60 years irrespective of sex treated by hemiarthroplasty using Austin Moore's or bipolar endoprosthesis, in the Department of Orthopaedics at IMCHRC, Indore between January 2014 to December 2016. Institutional ethics approval was taken before enrolment of study subjects. Individual written informed consent was taken before enrolment of subject. The study was carried out to evaluate the immediate and early results of hemiarthroplasty for intracapsular fracture of neck of femur in elderly.

### *Inclusion criteria*

Intracapsular fracture neck of femur in patients of age 60 years and above, ununited fracture neck of femur, fracture neck of femur with avascular necrosis, willing to participate in the study.

### *Exclusion criteria*

Patients below 60 years, avascular necrosis of femoral head with acetabular changes, pathological fractures of neck of femur, patients medically unfit for surgery, patients who were non ambulatory, prior to the fracture, not willing to participate in the study.

All study patients were put on skin traction and 3-5 kg of weight was applied to maintain the length of the lower limb and facilitate subsequent hemiarthroplasty procedure. Adequate medical management of associated comorbid conditions like diabetes mellitus, systemic hypertension and heart diseases were initialized to optimize patient's fitness for anaesthesia. Anteroposterior radiographs of the affected hip joint of pelvis with both hips were taken for all the patients (Figure 1), keeping the fractured limb in 15° internal rotation to bring the neck parallel to X-ray film.

All cases were done under regional anaesthesia that included spinal or epidural anaesthesia. The patients were placed in lateral position on the operating table with the affected side facing up. For all patients posterior

approach (Moore's Approach) was used in our series. A curved incision was taken from 10 cm distal to the posterior superior iliac spine, extended distally and laterally, parallel with fibers of gluteus maximus muscle to the posterior margin of the greater trochanter. The incision was then directed distally 10 cm along the femoral shaft. By blunt dissection, the fibers of the gluteus maximus were separated taking care not to disturb the superior gluteal vessels in the proximal part of the exposure. The gluteus maximum muscle was split and short external rotators were exposed. A tenotomy of the short external rotators was done close to their insertion on the inner surface of the greater trochanter. The capsule was incised by a T-shaped incision. Using a head extractor and bone levers, head was delivered out of the acetabulum and the acetabulum was cleared of debris.

The fractured head and neck of the femur was levered out of the acetabulum and size measured using femoral head gauge. The size was confirmed using a trial prosthesis by its suction fit in the acetabulum. The acetabulum was prepared by excising remaining ligamentum teres and soft tissue. The femoral shaft was rasped using a broach (rasp) and prepared for the insertion of the prosthesis. Femoral neck if long was nibbled keeping 2 to 2.5 cm of calcar above the lesser trochanter (Figure 2).

The appropriate-sized prosthesis was inserted into the reamed canal taking care to place it in 10-15° of anteversion. Adequate seating of the prosthesis on the calcar was visualized directly. The reduction of the prosthesis was then done using gentle traction of the thigh. After suturing the capsule the external rotators were sutured, the wound was closed in layers over a suction drain, which was removed at the first change of dressing after 48 hours.

Regular follow-up of all cases was done at 6 weeks, 3 months and at the end of 6 months. At each follow-up, patients were evaluated clinically using the Harris hip score<sup>10</sup> and radiologically with appropriate X-rays.<sup>11</sup> Harris hip score was used to evaluate the functional outcome in the present study. Results were rated as – excellent: 90-100; good: 80-89; fair: 70-79; and poor: < 70. Data was analyzed at the end of study. All the data were analyzed using descriptive statistics. The statistical software used was SPSS 20.0.

## RESULTS

Data was collected based on detailed patient evaluation with respect to history, clinical examination and radiological evaluation. The postoperative evaluation was done both clinically and radiologically [Figure 1 & 3]. Out of 30 patients treated in this manner, all cases were available for follow-up period of 6 months. Patients of age 60 years and above, diagnosed with fracture neck of femur, were included in the study. The average age was noted to be 71.6 years (61-87). Majority of patients belongs to age group 60-69 years was 56.7%. Females

were more common 56.7% than males in the present study (Table 1).

**Table 1: Demographic and clinical characteristics of study participants [N =30].**

Age (years)	Number of patients	Percentage	P value
<b>Age (years)</b>			
60-69	17	56.7	-
70-79	10	33.3	-
≥80	3	10	-
<b>Gender</b>			
Males	13	43.3	-
Females	17	56.7	0.4744
<b>Side involved</b>			
Left	19	63.3	-
Right	11	36.7	0.1663
<b>Type of fracture</b>			
Sub capital fracture	21	70	-
Transcervical fracture	9	30	0.0455
<b>Mode of injury</b>			
Trivial trauma like tripping or slipping	19	63.3	-
Fall from a height	4	13.3	-
Road traffic accident	7	23.3	-
<b>Associated injury</b>			
Abrasions	22	73.3	-
Vertebral compression fracture	3	10	-
Fractures of other bones	02	6.7	-
None specific	7	23.35	-
<b>Total hospital stay</b>			
<20 days	18	60	-
21-29 days	10	33.3	-
≥30 days	2	6.7	-

Left sided fractures were more compared to the right sided fractures. There were 19 (63.3%) patients with left sided fracture and 11 (36.7%) patients with right sided fracture (Table 1). On radiological examination, there were 21 patients (70%) with sub capital fracture and 9 patients (30%) had transcervical fractures. Majority of our study patients (63.3%) sustained the injury due to a trivial trauma like tripping or slipping. Most of such injuries can be classified as 'indirect' trauma. About 13.3% patients sustained the injury due to a fall from a height and 23.3% due to a road traffic accident (Table 1).

Three patients (10%) had anterior wedge compression fracture of L-3 vertebrae following a fall from moderate

height. About 22 (73.3%) patients had superficial abrasions and 6.7% patients had fracture at other bones. About 7 patients (23.35) had no specific associated injuries (Table 1). Systemic co-morbidities was present in 17 of 30 patients (56.7%), 20% patient had only cardiovascular disorders, 10% had diabetes, 6.7% had only hypertension, 10% had heart disease as well as diabetes, 10% had heart disease with hypertension and 23.3% had hypertension and diabetes mellitus. Duration of stay in hospital ranged from 12 to 37 days. About 20 patients (60%) had a stay of less than 20 days in hospital (Table 1).

In all patients, the average blood loss during surgery was below 750 ml except for 3 cases (10%) as two had bleeding diathesis. There were four cases of superficial wound infection and five cases with limb length discrepancy. None were reported with deep infection. In the present study there was one case (3.3%) of posterior dislocation of the prosthesis which was found on the 10th post-operative day. The dislocation was reduced under general anaesthesia. One patient (3.3%) had periprosthetic fracture along with posterior dislocation of prosthesis in postoperative period, who was re-operated and fracture established with stainless steel wire and prosthesis reduced into acetabulum.

**Table 2: Complications hemiarthroplasty for intra-capsular fracture neck of femur.**

Complications	No of patients	Percentage
<b>Periprosthetic fracture</b>	1	3.3
<b>Posterior dislocation</b>	1	3.3
<b>Fat embolism + Bed sore</b>	1	3.3
<b>Superficial infections</b>	6	20
<b>Bedsore</b>	2	6.7
<b>Deep infections</b>	Nil	
<b>Hypotension</b>	4	13.35
<b>Pain</b>		
<b>No pain</b>	4	13.3
<b>Mild</b>	5	16.7
<b>Moderate</b>	18	60
<b>Severe</b>	3	10
<b>Limp</b>		
<b>None to slight</b>	19	63.3
<b>Moderate</b>	9	30
<b>Severe</b>	2	6.7

About 05 patients (16.7%) had mild pain during follow up, whereas 18 (60%) had slight pain and 3 (10%) had marked pain. About 19 (63.3%) had none to slight limp. Moderate limp was seen in 30% of the subjects whereas only 2 (6.7%) of the patients had severe limp (Table 2).

### Use of support for walking

About 13 patients (43.3%) did not use any kind of support for walking, 9 (30%) patients used cane only for long walks and 9 (30%) patients used cane most of the time (Table 3).

**Table 3: Use of support for walking among hemiarthroplasty patients.**

Criteria	Score	No. of patients
None	11	13
Cane for long walks	7	9
Cane most of the time	5	9
One crutch	3	1
Two canes	2	0
Two crutches	0	0
Unable to walk	0	0

**Table 4: Distribution of the sample by criteria of walking distance.**

Criteria	Score	Frequency	Percentage
Unlimited	11	16	53.3
6 blocks	8	9	30
2-3 blocks	5	1	3.3
Indoors only	2	4	13.33
Bed and chair	0	0	0
Total	0	30	100

**Table 5: Range of motion after hemiarthroplasty after 1year follow up.**

	Austin Moore's (%)
Flexion (>50°)	96.7
Extension (>30°)	90
Abduction (>25°)	76.7
Adduction (>25°)	70
Internal rotation	80
External rotation	73.33

### Total functional result

The functional outcome after hemiarthroplasty for intracapsular fracture neck of femur was graded as excellent, good, fair and poor after adding the scores given for each criteria of assessment of hip. In our study Harris hip score, at end of six month ranged from 35 to 94.6. At final 6 months follow-up by Harris hip scoring system, 53.33% had excellent result, 33.3% had good results, 16.67% had fair results and 6.67% had poor results.



**Figure 1: Preoperative x-ray intracapsular fracture of femur. This fracture occurs at the level of the "neck" of the bone and may have loss of blood supply to the bone.**



**Figure 2: Prosthesis insertion in hemiarthroplasty is a type of hip replacement.**



**Figure 3: Post-operative x-ray. Hemiarthroplasty is a type of hip replacement in which only the "ball" of the hip is replaced.**

## DISCUSSION

The aim of treatment for intracapsular neck of femur fractures patients is to return to preinjury mobility status as early as possible.<sup>12</sup> The surgical options for hip fractures include internal fixation, hemiarthroplasty and total hip replacement. Hemiarthroplasty is considered the optimal treatment for active elderly patients with intracapsular neck of femur fractures and produce satisfactory results.<sup>13</sup> Internal fixation has a high rate of non-union and is inferior to hemiarthroplasty. Hemiarthroplasty using the Austin Moore's remains a popular choice.<sup>13</sup>

Out of 30 patients treated in this manner, all cases were available for follow-up period of 6 months. Patients of age 60 years and above, diagnosed with fracture neck of femur, were included in the study. The average age was noted to be 71.6 years (61-87). Majority of patients belongs to age group 60-69 years was 56.7%. Maruthi et al showed mean age of male patient was 68.86 years and mean age of female patient was 69.5 years in their study.<sup>14</sup> Study by Raghvendra et al also observed average age was noted to be 75 years (60-89).<sup>15</sup> Females were more common 56.7% than males in the present study. Other studies also showed higher number of females who sustained a fracture neck of femur as compared to the male population. Elderly females are more prone to fracture neck of femur due to osteoporosis.<sup>16</sup>

Female preponderance has been reported in several series. Moore et al: 62.5%, Anderson et al: 85%; Arwade et al: 68.3%, Kenzora: 77.4%.<sup>17-20</sup> Male preponderance was reported in few series: D'Acry and Devas: 91.4%; Mukherjee et al: 58.3%; Bavadekar et al: 60.9%.<sup>21-23</sup> Left sided fractures were more compared to the right sided fractures. There were 19 (63.3%) patients with left sided fracture and 11 (36.7%) patients with right sided fracture. On radiological examination, there were 21 patients (70%) with sub capital fracture and 9 patients (30%) had transcervical fractures.

Majority of our study patients (63.3%) sustained the injury due to a trivial trauma like tripping or slipping. This is a very common occurrence in elderly population where poor vision and lack of neuromuscular coordination is a problem. Most of such injuries can be classified as 'indirect' trauma. About 13.3% patients sustained the injury due to a fall from a height and 23.3% due to a road traffic accident.

Three patients (10%) had anterior wedge compression fracture of L-3 vertebrae following a fall from moderate height. About 22 (73.3%) patients had superficial abrasions and 6.7% patients had fracture at other bones. About 7 patients (23.35) had no specific associated injuries.

Difficulty in postoperative rehabilitation was particularly noticed in the patient who presented after 90 days

following trauma, probably due to bony and soft tissue changes that would occur in this duration that finally gave a poor outcome.

It was observed that the postoperative rehabilitation of patients was significantly affected by the presence of the above comorbidities. This also had an effect on the final functional result of the procedure. Similar observations have been made by Koval and Zuckerman and Bath.<sup>24,25</sup> Delay in taking up for surgery was usually for optimizing the medical condition of the patient. Deep vein thrombosis prophylaxis was given for all patients, using low molecular weight heparins, on admission and was stopped 12 hours before the surgery.<sup>25</sup>

It has been reported in literature that the average blood loss with hip hemiarthroplasty is less in the anterior approach as compared to the posterior approach.<sup>24,25</sup> The Harris hip score was used for outcome assessment in three randomised trials and in 246 patients, with follow-up intervals ranging from 12 to 48 months.<sup>26,27</sup> This score contains the subscales pain, function, deformity, and range of motion, and may achieve values from 0 to 100 points, with higher scores indicating better function.<sup>28</sup>

In the present study, the functional outcome after hemiarthroplasty for intracapsular fracture neck of femur was graded as excellent, good, fair and poor after adding the scores given for each criteria of assessment of hip. In our study Harris hip score, at end of six month ranged from 35 to 94.6. At final 6 months follow-up by Harris hip scoring system, 53.33% had excellent result, 33.3% had good results, 16.67% had fair results and 6.67% had poor results.

Our study was limited by the lack of randomization in selecting patients leading to selection bias and short series, so further study is needed with a proper patient selection and large series with long term follow up for definitive opinion regarding the superiority of Austin Moore's hemiarthroplasty in intracapsular neck of femur fractures. First, our duration of follow-up of 6 months is very less in assessing the longevity and functional endurance of the prosthesis used and hence coming to definitive conclusions. Second, we have not evaluated the degree of intraprosthetic motion at the inner-bearing at each follow-up.

## CONCLUSION

Thirty cases of fracture neck of femur in elderly patients above the age of 60 years treated by hemiarthroplasty using either Austin Moore's, or bipolar prosthesis were followed up for 6 months and the short term functional results were analyzed by using modified Harris hip scoring system. The intracapsular neck of femur fracture in active elderly patients treated with Austin Moore's hemiarthroplasty had better outcome regarding pain and hip function. No radiological changes or complications were noticed in any patients, at the end of 6 months

follow-up. In our study Harris hip score, at end of six month ranged from 35 to 94.6. At final 6 months follow-up by Harris hip scoring system, 53.33% had excellent result, 33.3% had good results, 16.67% had fair results and 6.67% had poor results.

We conclude that hemiarthroplasty for fracture neck of femur is a good option in elderly patients. The mortality and morbidity are not high, operative procedure is simple, complications are less disabling. Early functional results are satisfactory. The complications are less disabling, weight bearing is early, early functional results are satisfactory and second operation is less frequently required.

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