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Study of Functional Outcome Following Hemiarthroplasty for Management of Intracapsular Fracture of Neck Femur

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KEYWORDS

Bipolar hemiarthroplasty, fractures of the femoral neck, active elderly individuals, functional outcome

ABSTRACT:

Background: The neck of femur fracture is one of the common fractures in elderly. Though, Primary total hip replacement is being preferred at many tertiary centers in India. Still its not popular in government hospitals due to high cost and majority of the patient doing well with hemiarthroplasty. Present study was aimed to study functional outcome following Hemiarthroplasty for management of intracapsular fracture of neck femur in elderly patients.

Material and Methods: Present study was prospective, observational study, conducted in patients with X ray proven Intracapsular fracture of femoral neck in elderly patients above age of 60 years, able to rehabilitate, underwent Hemiarthroplasty.

Results: Most of the patients were found to be male. Patients with left side being affected in 47%, with right side about 53 %. Majority of study patients (80%) had a trans- cervical type of fracture Basi cervical – 13.3 % and sub- capital fractures – 6.66%. Most commonly used prosthesis size was 45mm followed by 43mm, 47mm and 41mm and 47 mm 21 patients were cemented, 9 patients were uncemented. Limb lengthening (< 1cm) was observed in two patients (6.66%), limb shortening > 2 cm observed in 5 patients(16.66%) post- operatively due to technical errors in the form of the prosthesis sitting proud of the calcar. On analyzing the anteroposterior view x ray of pelvis with hip in 15 degrees of internal rotation. It was found that 75 percent patient had good results, 25 percent patients with excellent results. Overall, as per Harris Hip Score, 8 patients (26.66%) achieved Excellent result, 14 patients (46.66%) achieved good result, 6 patients (20%) achieved fair result and 2 patients (6.66%) achieved poor result.

Conclusion: Bipolar hemiarthroplasty for fractures of the femoral neck provides freedom from pain and more rapid return to unassisted activity with an acceptable complication rate.

INTRODUCTION

The neck of femur fracture is one of the common fractures in elderly. It has been always a challenge to the orthopaedic surgeons to manage these fractures. The frequency of neck of femur fractures has risen due to factors such as the growing incidence of osteoporosis, diminished vision in the elderly, decreased neuromuscular coordination, changes in lifestyle, sedentary behavior, and improvements in life expectancy.[1,2] The incidence is expected to be double in next twenty years, triple by 2050. [1,2] The burden of neck of femur fractures and its sequelae continued to be on the rise.

The treatment goal for these fractures is restoring of functions without morbidity, still controversy exists in management of neck of femur fractures in elderly. Open reduction and internal fixation in elderly has higher chance of nonunion & avascular necrosis.[3] Currently the orthopaedic surgeons can choose between unipolar, bipolar and total hip replacement in the treatment of intracapsular fractures in elderly.[3,4]

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Though, Primary total hip replacement is being preferred at many tertiary centers in India. Still, it's not popular in government hospitals due to high cost and majority of the patient doing well with hemiarthroplasty. Present study was aimed to study functional outcome following Hemiarthroplasty for management of intracapsular fracture of neck femur in elderly patients.

MATERIAL AND METHODS

Present study was prospective, observational study, conducted in department of Orthopaedics, RajaRajeswari Medical College and Hospital, Bengaluru, India. Study duration was of 2 years (May 2022 to June 2024). Study was approved by institutional ethical committee. Patients with X ray proven Intracapsular fracture of femoral neck in elderly patients above age of 60 years, Able to rehabilitate, willing to participate in present study were considered for present study.

Study was explained to participants in local language & written informed consent was taken. All patients were admitted on arrival, after history taking (age, sex, mode of trauma, period between injury and arrival), general and systemic examination as well as local examination of the patient was done. Thorough assessment of patient was done to rule out head/ chest/ abdominal/spinal or pelvic injury/ associated fractures. Stabilization of patient was done with intravenous fluids, oxygen and blood transfusion as and when required.

Radiological assessment was done as Anteroposterior and true lateral views of injured limb including complete knee joint, Pelvis and involved femur. Preoperative investigations such as Hemogram, Blood sugar level, Blood urea level, Serum creatinine level, Electrolytes, Blood group and Rh typing, Bleeding time, clotting time and prothrombin time were done in all patients. Chest X-ray postero-anterior view, electrocardiography, 2D Echo and other investigations done in patients as required during anaesthetic evaluation.

Under appropriate anaesthesia, all patients underwent Hemiarthroplasty for management of intracapsular fracture of neck femur. At the time of presentation all the patients analysed for Functional outcome using modified hip score & Radiological assessment. Modified Harris hip score was used for analysis of the functional outcome for all the patients. Radiological assessment was done by X ray anteroposterior view with internal rotation of 15 – 20 degrees was taken for all the patients and analysed for radiological parameters like joint space, any subluxation, acetabular changes, based on which grading was done. Finally, the two parameters compiled and analysed.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Statistical analysis was done using descriptive statistics.

RESULTS

The patients who have completed post op period minimum of 2 years included in the study. The average age was noted to be 72 years. The youngest patient in the study was 61 years and the oldest was 85 years. Most of the patients were found to be male. Patients with left side being affected in 47%, with right side about 53 %. Table-4 depicts the mode of injury causing the fracture of the neck of femur. 66.66% of the patients sustained the injury by tripping or slipping, 20% due to RTA and the remaining 13.33% by a fall from a height.

Table 1: General characteristics

Characteristics	**No. of subjects**	**Percentage**
Age group (in years)		
61-70	21	70
71-80	7	23.33
>80	2	6.66
Gender		
Males	19	63.33
Females	11	36.66
Side affected		
Right	16	53.3
Left	14	46.6
Mode of Injury		
Tripping/slipping	20	66.66
RT	6	20
Fall from a height	4	13.33

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Majority of study patients (80%) had a trans- cervical type of fracture Basi cervical – 1 3.3 % and sub- capital fractures – 6.66%.

Table 2: Radiological types of fracture

Radiological Type	Number of Patients	Percentage
Trans-cervical	24	80
Basi cervical	4	13.3
Sub-capital	2	6.66

Most commonly used prosthesis size was 45mm followed by 43mm, 47mm and 41mm and 47 mm

Table 3: Size of prosthesis

Size of the prosthesis	No. of patients	Percentage
39 mm	2	6.66
41 mm	4	13.33
43 mm	7	23.33
45 mm	10	33.33
47 mm	4	13.33
49 mm	2	6.66
51 mm	1	3.33

In this study, 21 patients were cemented, 9 patients were uncemented.

Table 4: Cemented Vs Uncemented

Cemented/ not	No. of patients	percentage
Cemented	21	70
Uncemented	9	30

Limb lengthening (< 1cm) was observed in two patients (6.66%), limb shortening > 2 cm observed in 5 patients(16.66%) post- operatively due to technical errors in the form of the prosthesis sitting proud of the calcar.

Table 5: Complications

Complications	No. of patients	Percentage
Limb	2	6.66
Shortening < 2 cm	5	16.66

At the final follow-up, 25 patients (83.33%) had slight, occasional, no compromise in activities while 4 patients (11.66%) had mild pains with no effect on average activities. Our study compares favorably with other standard studies evaluating pain relief with Bipolar Hemiarthroplasty. 23 (76.66%) of the study patients had slight limp while 4 patients(13.33%) had a moderate limp. 17 patients (56.66%) were found to be ambulating without the help of any support and the remaining 13 patients (43.33%) needed some support in the form of a cane or walker for long walks. 16(53.33%) of the study patients could walk an unlimited distance at any given point of time while 11 patients (36.66%) could walk no more than 1000 meters at a time and 3 patients (10%) could only manage 500 meters at a time.

On evaluation of the patients ability to climb stairs it was found that 6 patients (20%) were able to climb stairs without the use of any support or railing while the remaining 22 patients (73.33%) were able to do so with the support of the railing, 2 patients (6.66%) not able to climb.

Our patients did not have the habit of using shoes and socks, their ability to trim their toe nails was used as a parameter for evaluation. It was found that 2 patients (6.66%) were able to trim their toe nails without any difficulty while 7patients (23.33%) found it difficult to do so, 21 patients (70%) not able to do.

With regards to the ability to sit for a long duration it was found that17 (56.66%) of the study patients were able to sit comfortably on a chair for up to one hour while 13 patients (43.33%) were not able to sit on a chair for more than half an hour at a stretch. None of the 30 study patients had fixed deformities. 2(6.66% of the patients had post-operative limb lengthening by 1 cm. 5

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patients(16.66%) have shortening < 2.5 cm

Table 6: ANALYSIS OF THE HARRIS HIP SCORE

	No. of patients	Percentage
Pain		
Mild pain	25	83.33
Moderate pain	4	13.33
Severe pain	1	3.33
Gait Analysis		
Mild	23	76.66
Moderate	4	13.33
No limp	3	10
Ambulation		
Without support	17	56.66
With support	13	43.33
Walking distance		
Unlimited	16	53.33
< 1 km	11	36.66
< 500 meters	3	10
Climbing stairs		
Without support	6	20
With support	22	73.33
Not able to climb	2	6.66
Trimming nails		
Able to do with ease	2	6.66
Able to do difficulty	7	23.33
Not able to do	21	70
Ability to sit		
>1 hour	17	56.66
< 1/2 hour	13	43.33

RADIOLOGICAL PARAMETERS:

On analyzing the anteroposterior view x ray of pelvis with hip in 15 degrees of internal rotation. It was found that 75 percent patient had good results, 25 percent patients with excellent results.

HARRIS HIP SCORE

Harris Hip Score evaluated at maximum follow-up averaged 85.68 with the maximum score being 95 and the minimum score being 65.8. Overall, 8 patients (26.66%) achieved Excellent result, 14 patients (46.66%) achieved good result, 6 patients (20%) achieved fair result and 2 patients (6.66%) achieved poor result. In our study 73.32% of the patients achieved an excellent or good result.

Table 7: FINAL HARRIS HIP SCORE AND CLINICAL RESULT

Grade	Harris Hip Score	No. of patients	Percentage
Excellent	90-100	8	26.66
Good	80-89	14	46.66
Fair	70-79	6	20
Poor	<70	2	6.66

DISCUSSION

The aim of replacement surgery in fracture neck femur is early return to daily activities. This is particularly applicable to the elderly age group where complications need to be prevented.

Modular prosthesis is now introduced in the market which allows for neck adjustment, future conversion to total hip replacement is easier. Because only acetabular component only has to be added. Unipolar prosthesis is used only in developing countries. It should be reserved for active elderly and very limited patients.[5,6] In India, bipolar prosthesis is slowly replacing unipolar prosthesis in elderly patients, because of the advantage of bipolar than unipolar like less post

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operative pain, good results, good range of movements & cost effectiveness.[7,8,9]

The mean age of the patients in the present study was 72 years. The aim of assessing age is to estimate the patient's mean survival time and their ability to comply with rehabilitation protocol. Patients with hip fractures have an increased mortality rate during the first year after fracture but after one year the mortality rate is comparable to that of the general population. The results of our study showed that age of the patient had minimal influence on the final clinical result.

In our study males affected in higher numbers. Right side more commonly affected than the left. Majority of our study patients (66.66%) 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 neuro-muscular coordination is a problem. 36.62 % of the patients were brought to the hospital within 24 hours of the injury while 43.33% presented for treatment within 24 hrs. - 72 hrs. This is a common scenario in our country where patients present to a doctor much late given the seriousness of the condition.[10]

All of our study patients had a displaced fracture of the neck of femur. Majority of the patients (80%) had a trans- cervical fracture. The anatomical type of fracture and the displacement did not have any bearing on the final function. All patients were operated after being put into lateral decubitus position by the lateral approach or posterior approach of Moore. The lateral approach was preferred because of the familiarity of most of the surgeons at our institution with the approach.

The size of the prostheses used, in general matched well with the pre- operatively measured size of the head as assessed by X-rays. In 33.33% of the cases 45 mm prostheses were used. This was followed in frequency by 43 mm (23.33%), 47 mm (13.33%) and 41 mm (13.33%) prostheses in the order of frequency

Limb lengthening (<1 cm) was observed in 2 patients (6.66%), limb shortening(<2 cm) observed in 5 patients (16.66%) post- operatively due to technical errors in the form of the prosthesis sitting proud of the calcar.

The minimum duration of hospital stay amongst the study patients was 16 days and maximum duration was 39 days with the average being 22 days. Average hospital stay of 21 days with bipolar hemiarthroplasty has been reported by Lestrange NR,[11] Drinker and Murray[12] have reported an average hospital stay of 23 days with the same procedure.

There were no late postoperative complications like loosening, dislocation, erosion, secondary osteoarthritis, protrusion acetabuli or periprosthetic fracture in our study. All the patients who completed a minimum 6 months follow-up were included in the final analysis. The Harris Hip Scores, radiological parameters, were done in order to find out any correlation that exists between these parameters.

With radiological parameters analysis, 75 percent had good results,25 percent had excellent results. The radiological parameters which we analysed attached in the annexure. There is no correlation between the functional outcome and radiological outcome.

In our study, the final Harris Hip Score as evaluated at maximum follow-up averaged 85.68 with the maximum score being 93 and the minimum score being 65.8. Overall, 8 patients (26.66%) achieved Excellent result, 14 patients (46.66%) achieved good result, 6 patients (20%) achieved fair result and 2 patients (6.66%) achieved poor result. Overall, 73% of the patients achieved an excellent or good result. Our results are comparable with other studies of bipolar hemiarthroplasty performed for fracture neck femur.

Although the excellent results are comparatively less than other studies, it was found that our patients associated with comorbidities, late presentation to hospital, delay in getting the patients for surgery had influenced the outcome. All the patients were also evaluated towards level of satisfaction with the procedure and their ability to return to pre-fracture level of activity, 36.36% were 'very satisfied', 45.45% were 'fairly satisfied' and 18.18% were 'not satisfied'. The level of satisfaction being a subjective assessment did not correlate well with the Harris Hip Score which was an objective assessment.

Table 8: Comparison of our clinical result with other studies

Grade	Our study	Moshein[13]	Lestrange study[11]
Excellent	26.66	40	39.6
Good	46.66	25	31.2
Fair	20	23	15.3
Poor	**6**.66	12	13.9

The results obtained with bipolar hemiarthroplasty in the current study are comparable with standard studies. Although the excellent are comparatively less than standard studies. It was found that our patients associated with comorbidity, late presentation to hospital, delay in getting the patients for

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surgery and associated has influenced the outcome.

CONCLUSION

Bipolar hemiarthroplasty for fractures of the femoral neck provides freedom from pain and more rapid return to unassisted activity with an acceptable complication rate. The end functional results depend on the associated co morbidity and optimum post operative rehabilitation.

Our study patients have good radiological outcome & bipolar seems to be a cost-effective prosthesis in active elderly individuals. Similar study on long term follow up would provide more affirmative findings.

Conflict of Interest: None to declare
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