



FUNCTIONAL OUTCOME OF NECK OF FEMUR FRACTURES TREATED BY HEMIARTHROPLASTY WITH CEMENTED BIPOLAR PROSTHESIS-A RETROSPECTIVE COHORT STUDY

Surgery

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ABSTRACT

Introduction: Neck of femur fractures are prevalent among the elderly and contribute significantly to fracture-related morbidity and mortality worldwide. The rising incidence of these fractures can be attributed to factors like osteoporosis, age-related vision impairment, reduced neuro-muscular coordination, lifestyle changes, sedentary habits, and increased life expectancy. Controversy surrounds the treatment choice for displaced neck of femur fractures, but hemireplacement arthroplasty with a bipolar prosthesis is often considered the superior option for elderly patients. **Objectives:** The primary objective of this study was to assess the functional outcomes of neck of femur fractures treated with hemiarthroplasty using cemented bipolar prostheses. Secondary objectives included evaluating pain and mobility outcomes. **Methods:** We conducted a retrospective cohort study on 30 patients with neck of femur fractures treated with hemireplacement arthroplasty using cemented bipolar prostheses at our institutions from February 2019 to February 2021, with a minimum of 2 years post-surgery follow-up and results were analysed using Harris hip score. Statistical analysis was performed using SPSS software, employing descriptive statistics such as frequency, percentage, and mean. **Results:** Among the study population, 60% were females, and 40% were males. The left side was affected in 53.33% of patients, with slip and fall being the most common mode of injury (80%). A total of 53.33% of patients reported no pain, while 46.67% were ambulant without support. Of these, 20% were able to climb stairs without assistance, and 20% could manage stairs with support. No fixed deformities, stem loosening, acetabular erosion, or protrusio acetabuli were observed. The Harris hip score indicated that 33.33% achieved excellent results, 36.67% had good outcomes, and 30% showed fair results in our study population. **Conclusion:** Hemiarthroplasty with bipolar prostheses offers early mobilization, effective pain relief, and an improved level of activity with minimal complications. Early mobilization can reduce the incidence of pressure sores, pneumonia, deep vein thrombosis, and other complications in the elderly population, making it an ideal treatment for neck of femur fractures in the elderly age group.

KEYWORDS

Fracture neck of femur, Functional outcome, Retrospective cohort study, Cemented Bipolar hemiarthroplasty, Harris Hip score

INTRODUCTION

The neck of femur fracture is one of the common fractures in elderly. It was described as "the unsolved fracture"[1]. Hip fractures account for most of the fracture related morbidity and mortality in the elderly age group worldwide[2]. The quality of life decreases in majority of patients following a hip fracture. The mortality following hip fractures is high, with the risk of death in the initial months following the fracture going up to 33%. Also the overall number is increasing because of increase in the mean age of the population. The prevalence of neck of femur fractures is increasing with increased incidence of osteoporosis, poor vision in elderly, poor neuro muscular coordination, life style changes, sedentary habits, improvement in life expectancy. There is still controversy about the choice of treatment of displaced fractures of the neck of femur. Nonunion and avascular necrosis of the femoral head or a combination of both is the main complication following fractures of the femoral neck. In spite of improved operative techniques, nonunion is still reported in 10-20% of cases. The main reason is a combination of unfavorable biomechanical and vascular conditions caused by the fracture itself. The main causes which contribute to nonunion in neck of femur fractures are the lack of callus formation due to absence of cambium layer in periosteum, inhibition of callus by the synovial fluid and the inadequate blood supply to femoral head in displaced fractures. Internal fixation either by multiple screws or sliding plate is associated with less operative trauma but complications such as non-union, and avascular necrosis may require revision subjecting the already high-risk old age patients to further revision surgery[3]. In neck of femur fracture in young patients, internal fixation is preferred. Few will disagree that the best femoral head that a young patient can have is his or her own native femoral head. With higher chance of nonunion & avascular necrosis in internal fixation of neck of femur fracture in old patients, it is not preferred in the elderly age group Hip arthroplasty has become the best treatment choice in elderly for early mobilization and for reducing morbidity. Currently the orthopaedic surgeons can choose between unipolar, bipolar and total hip replacement in the treatment of neck of femur fractures in elderly. Stem loosening and acetabular erosion are the common complications associated with unipolar prosthesis. In 1974, Bateman introduced bipolar prosthesis which had mobile head element and had additional head surface to allow movement within acetabulum. This reduces the erosion in acetabulum and reduction in pain and incidence of protrusio. The motion occurs between metal head and polyethylene socket (inner bearing) as well as between

metallic head and acetabulum (outer bearing). In India, bipolar prosthesis has replaced unipolar prosthesis in elderly patients, because of less post-operative pain, good results, good range of movements & cost effectiveness. The results of hemiarthroplasty are initially better, but if the patient survives longer, then the function deteriorates. Failure in the form of infection, dislocation, and perioperative death happens early while increasing pain, loosening, and erosion of the acetabulum constitute the late complications[4]. The role of total hip arthroplasty for the treatment of displaced intracapsular fractures of the proximal femur in active patients is controversial. Some authors have shown that such patients, when treated with a bipolar or unipolar hemiarthroplasty, are at increased risk of developing acetabular erosion that might require later revision to a total hip replacement[5]. In a prospective randomized study of 81 patients, Baker et al. concluded that total hip arthroplasty conferred superior short-term clinical results and fewer complications when compared with hemiarthroplasty[6]. In a multicenter randomized controlled trial involving 207 patients, Keating et al. concluded that arthroplasty is more clinically effective and cost-effective than reduction and fixation in healthy older patients with a displaced intracapsular fracture of the hip. The long-term results of total hip replacement may be better than those of bipolar hemiarthroplasty[7]. However, other authors have strongly recommended avoiding total hip replacement in active elderly patients without pre-existing acetabular disease[8]. Bipolar hemiarthroplasty appears to be the best option in active elderly group in our country. Still long term follow up results in Indian scenario are not available in literatures. We did this study for better understanding of problems and results with bipolar hemiarthroplasty.

MATERIALS AND METHODS

Study setting:

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30 patients with neck of femur fractures treated with hemireplacement arthroplasty using cemented bipolar prostheses at our institutions, during the period of February 2019 to February 2021, with age >60 yrs and a minimum of 2 years post-surgery follow-up were included in this retrospective cohort study. Patients with pathological fracture, patients who were bedridden prior to trauma and patients who had previous hip surgery were excluded. The sampling design employed was consecutive sampling. The contact list of neck of femur fracture

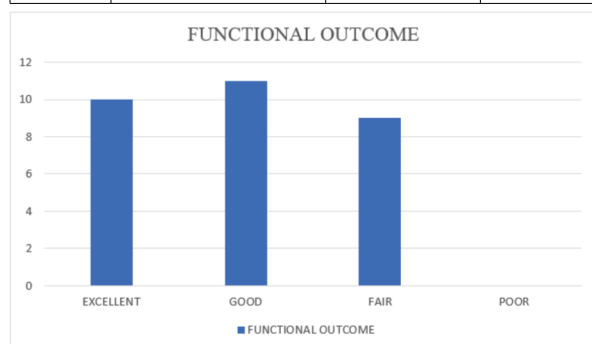
patients who were treated by hemiarthroplasty with cemented bipolar prosthesis from February 2019 to February 2021 was obtained from medical records department. All the patients were communicated by phone. At the time of visit a proforma was used to analyze all the patients uniformly. All the patients were analysed for functional outcome using modified Harris hip score.

OBSERVATIONS AND RESULTS

The following observations were made from the data collected during this study. The average age is 75 years. The youngest patient is 65 years and the oldest is 90 years at the time of study. 40% of the patients were males and 60% were females. Left side affected in 53 percentage and right side affected in 47 percentage of the patients in the study population. 80% of the fractures caused by slip and fall. Majority of the fractures caused by trivial trauma in our study population. Out of the 30 subjects, 9 (30%) had hypertension and were on antihypertensive medications, 7 were diabetic (23.33%), 4 patients had Coronary artery disease, and 1 was on anti asthma for bronchial asthma. 70% of the fracture belonged to Gardens classification type 3 and 4. The most commonly used prosthesis size was 45 mm followed by 43 mm. Out of the 30 patients, one patient had post op wound infection in the early post op period. One patient had myocardial infarction in the early post op period. On examination 1 patient was having limb shortening of 1 cm. At the time of follow up, 16 patients had no pain, 13 patients had slight occasional pain with no compromise of activities and 1 patient had mild pain, with no effect on average activities. 8 patients had no limp, 21 patients had slight limp, 1 patient had a moderate limp. 14 patients were found to be walking without any support, and the remaining 16 patients needed some support for long walks. Out of the 30 patients, 6 were able to climb stairs without support. 21 patients used railing for climbing stairs. 3 patients were unable to climb stairs. 17 patients were able to walk an unlimited distance, 9 patients could walk no more than 1 km and 4 patients could manage less than 500 metres at a time. In our study population majority of patients were not in the habit of using socks or shoes. So their ability to trim nails was used as parameter for evaluation. 11 patients were able to do trim nails with ease, 16 patients were able to do so with difficulty while 3 patients were not able to do so. 83.33 percentage of the study population were able to sit comfortably on a chair for upto 1 hour, 16.67 percentage of the population were not able to sit on a chair for more than half an hour at a stretch. In our study the average Harris Hip Score is 84.43 at the time of follow up. Overall 10 patients were having excellent result, 11 patients had good result, 9 patients had fair result. In our study, 70 percent of the patients had excellent or good result (Table 1, Graph 1)

Table 1 : Result according to Harris hip score

GRADE	HARRIS HIP SCORE	No. of patients	Percentage
Excellent	90-100	10	33.33
Good	80-89	11	36.67
Fair	70-79	9	30
Poor	<70	0	0



Graph 1: Result according to Harris hip score

DISCUSSION

Intracapsular fracture neck of femur are relatively common injuries among the elderly individuals. In order to reduce the morbidity and mortality, the aim of management should be towards making the patient mobile. The aim of replacement surgery in fracture neck femur is early return to daily activities. In the present study, thirty cases of intracapsular fracture neck of femur were surgically managed by Bipolar endoprosthesis. The purpose of this study is to evaluate the

functional outcome of the management of these fractures with cemented bipolar prosthesis. The mean age of the patients in this study is 65 years. In our study, 60 % of the patients were females. Left side was affected in 53.3 % patients. Majority of our study patients (80%) sustained the injury due to a trivial trauma like tripping or slipping. This is a very common occurrence in elderly population where osteoporosis, poor vision and lack of neuro-muscular coordination are a problem. All patients were operated after being put into lateral decubitus position by the lateral approach. The lateral approach is preferred as the posterior dislocation is more common after posterior approach. The size of the prosthesis used, matched well with the pre-operatively measured size of the head as assessed by X-rays. In 36.67% of the cases 45 mm prostheses were used. This was followed in frequency by 43 mm (26.67%), 41 mm (13.33%) and 49 mm (10%) prostheses in the order of frequency. Out of the 30 patients, one patient had post op wound infection in the early post op period. Infection subsided with antibiotic treatment. One patient had myocardial infarction in the early post op period. On examination 1 patient was having limb shortening of 1 cm. The average hospital stay for these patients were 18 days. Multiple comorbidities in the old age patients resulted in delay in surgery and prolonged stay. Average hospital stay of 21 days with bipolar hemiarthroplasty has been reported by Lestrange[83]. There were no late post operative complications like dislocation, periprosthetic fracture or infection in our study. No evidence of acetabular erosion, protrusio acetabuli or stem loosening were noticed. In our study 53.33 percent of the patients had no pain. 43.3 percent of patients had slight pain. 1 patient had mild pain not affecting average activities. This indicates that bipolar prosthesis provides pain free hip in majority of patients. 8 patients had no limp, 21 patients had slight limp, 1 patient had a moderate limp. 46.67 percentage of the patients were ambulant without support. The remaining 53.33 percent required some support for long walks. 20 percentage of the patients were able to climb stairs without support, 70 percentage with support. Only 10 percentage were not able to climb the stairs. 56.67 percentage of the study patients could walk an unlimited distance. In our study majority of the patients had no restriction in daily activities. There were no patients with fixed deformity in our study. Functional outcome was assessed by harris hip score. In our study population the average Harris Hip Score at the time of follow up is 84.43. Overall 10 patients were having excellent result, 11 patients had good result, 9 patients had fair result. In our study, 70 percent of the patients had excellent or good result. The results of this study are comparable with the other studies of bipolar hemiarthroplasty for neck of femur fractures (Table 2)

Table 2: Comparison of our clinical result with other studies

Result	Score	Present Study	Moshein[9]	Lestrange[10]
Excellent	91-100	33.7%	40%	39.6%
Good	80-89	36.7%	25%	31.2%
Fair	70-79	30%	23%	15.3%
Poor	<70	-	12%	13.9%

Hemi replacement arthroplasty with bipolar prosthesis helps in early mobilization of the patients and reduces the chance of deep vein thrombosis, bed sore associated with prolonged immobilization. It improves the quality of life in the elderly patients with fracture neck of femur.

Our study is not without its shortcomings. Out of 45 patients who had been contacted, 5 patients had expired, and only 30 patients came for follow up. The relative difficulty in travelling owing to old age was the most cited reason for not being able to come for follow up. Our duration of follow up of minimum 2 years and maximum 5 years is a short term study in assessing the longevity and functional outcome of this procedure.

CONCLUSION

In conclusion, it is evident that the incidence of fracture neck of femur is prevalent among the elderly population. In addressing this issue, bipolar hemiarthroplasty emerges as a safe and effective surgical approach, yielding favorable outcomes. This procedure not only offers the promise of early mobilization but also proves to be instrumental in pain management and enhancing the level of activities for elderly individuals, all while minimizing the risk of complications. The emphasis on early mobilization is a pivotal factor in this regard, as it can significantly reduce the chances of potential complications such as pneumonia, deep vein thrombosis, and bed sores.

In essence, bipolar hemiarthroplasty emerges as the preferred treatment modality for femoral neck fractures in the elderly population. Its multifaceted benefits, including enhanced mobility, pain relief, and complication prevention, underscore its vital role in providing a better quality of life for our elderly patients.

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