

Research Article

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Management of fracture neck of Femer with Bipolar Arthroplasty

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Abstract

Keywords

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Lengthening,
Prosthesis,
Acetabular.

25 patients were treated with bipolar hemiarthroplasty for fracture neck of femur .Out of the 25 cases treated in this manner; all cases were available for the follow up period of 6 months. Patients with age 50 years and above were with acute fracture neck of femur were included in the study. The average age of the study patients was 65 years with involvement of the left side in 56%. All the patients were operated under spinal or epidural anesthesia in lateral decubitus position by the posterior approach of Moore. There was one case of superficial infection, two cases of limb lengthening <1cm. At final 6 months follow-up by Harris Hip scoring system, 36.36% had excellent result, 45.45% had good results, 9.09 % had fair results and 9.09 % had poor results. The results of our study are comparable with standard studies of bipolar hemiarthroplasty performed for fracture neck of femur.

Introduction

Femoral neck fractures, one of the most common injuries in the elderly, have always presented great challenges to orthopedic surgeons. The prevalence of these fractures has increased with improvement in life expectancy, increased incidence of osteoporosis, poor vision, neuro-muscular in coordination and changes in lifestyle leading to sedentary habits. The goal of treatment of femoral neck fractures is restoration of pre-fracture function without associated morbidity (1).

The introduction of a single piece unipolar metal prosthesis by Thomson in 1954 and Austin Moore in 1957, to replace the femoral head ushered in the era of

hemiarthroplasty of the hip as a treatment for these fractures. Currently, surgeons can choose between unipolar hemiarthroplasty, bipolar hemiarthroplasty and total hip arthroplasty in the treatment of intracapsular fractures of the neck of femur in the elderly.

The problems encountered with unipolar prostheses (Austin Moore's Prosthesis and Thomson's Prosthesis) were acetabular erosion and loosening of stem giving rise to pain. Bateman in 1974 introduced the bipolar prosthesis (initially popular as the Bateman's prosthesis) which had mobile head element and had additional head surface to allow movement within the acetabulum.

This led to reduced wear of acetabular surface and hence reduced incidence of pain and acetabular protrusion because motion is present between the metal head and the polyethylene socket (inner bearing) as well as between the metallic head and acetabulum (outer bearing) (2).

Bipolar prosthesis is slowly replacing the conventional unipolar prosthesis in the ever increasing segment of 'active elderly' because of its superior benefits and its attractive pricing (2, 3). Its advantages over unipolar end prosthesis are higher percentage of satisfactory results, less post-operative pain, greater range of movements, more rapid return to unassisted activity and reduced incidence of acetabular erosion (3, 4).

With the superiority of prosthetic replacement over internal fixation in elderly being well established, primary Total Hip Replacement (THR) is being offered at many centers as a treatment option for these fractures.

Bipolar hemiarthroplasty thus appears to be the best option for acute fracture neck femur in the elderly in our population. However, not much literature is available about its long term results. We have taken up this study to gain a deeper understanding of the results and problems associated with this procedure.

Aims and objectives

- To study the functional outcome of intracapsular fracture of femoral neck with bipolar prosthesis in Indian population.
- To study the end results of bipolar prosthesis with respect to pain, mobility and stability.

- To study the complications of bipolar hemiarthroplasty

Materials and Methods

This is a prospective study which was done on 25 patients, who have sustained an intracapsular femoral neck fracture and were admitted in the hospital. Patients with fracture neck of femur satisfying the inclusion criteria, who required surgical intervention, were worked up clinically and radiologically. All patients selected for the study were examined according to protocol, associated injuries, if any, were noted and investigations carried out in order to evaluate fitness for anesthesia. Patients included were with displaced fractures of the intracapsular part of the femoral neck, age of patient > 50 years, failed internal fixation, avascular necrosis of femoral head secondary to fracture of the femoral neck.

Patients below 50 years, with arthritic changes involving the acetabulum, pathological fractures, those not willing for surgery and those who were medically unfit for surgery were excluded from the study.

Results

During the period between April 2012 and May 2013, 25 patients were treated with bipolar hemiarthroplasty for fracture neck of femur. Data was collected based on detailed patient evaluation with respect to history, clinical examination and radiological examination. The postoperative evaluation was done both clinically and radiologically. Out of the 25 cases, all patients were available for follow up till 6 months which was taken as a basic pre-requisite for inclusion in the study.

TABLE-1 shows the age distribution pattern of the patients.

Age in years	No. of patients	Percentage (%)
51 - 60	6	24
61 -70	12	48
71 -80	7	28

The average age was noted to be 65 years. The youngest patient in the study was 53 years and the oldest was 78 years.

TABLE-2 shows the sex distribution pattern of the study patients

Sex	No. of patients	Percentage (%)
Males	11	44
Females	14	56

TABLE – 3 shows the laterality pattern of all the study patients

Side affected	No. of patients	Percentage (%)
Right	11	44
Left	14	56

GRAPH-1 Laterality

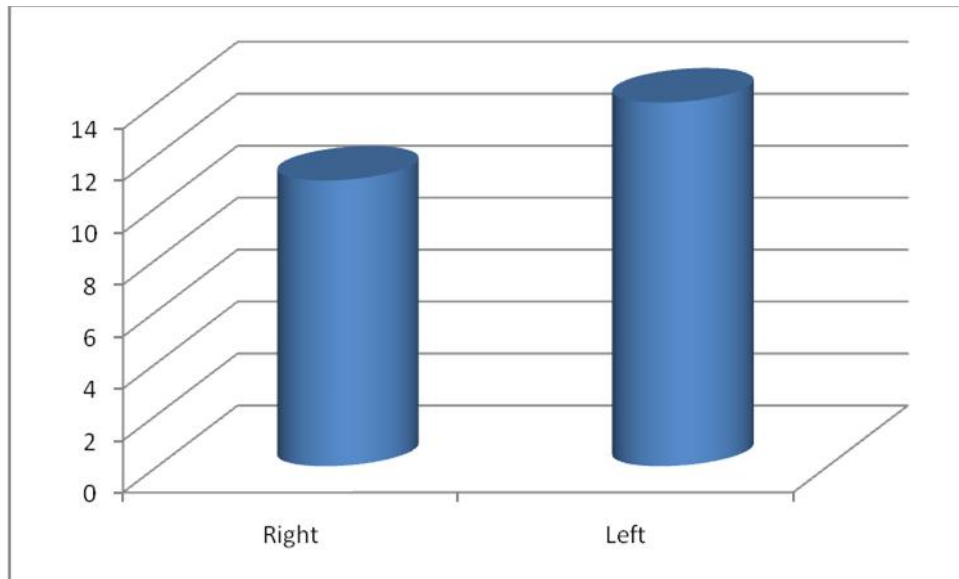


TABLE-4 depicts the mode of injury causing the fracture of the neck of femur

Mode of Injury	No. of patients	Percentage (%)
Tripping/slipping	16	64
RTA	3	12
Fall from a height	6	24

GRAPH-2 Mode of injury

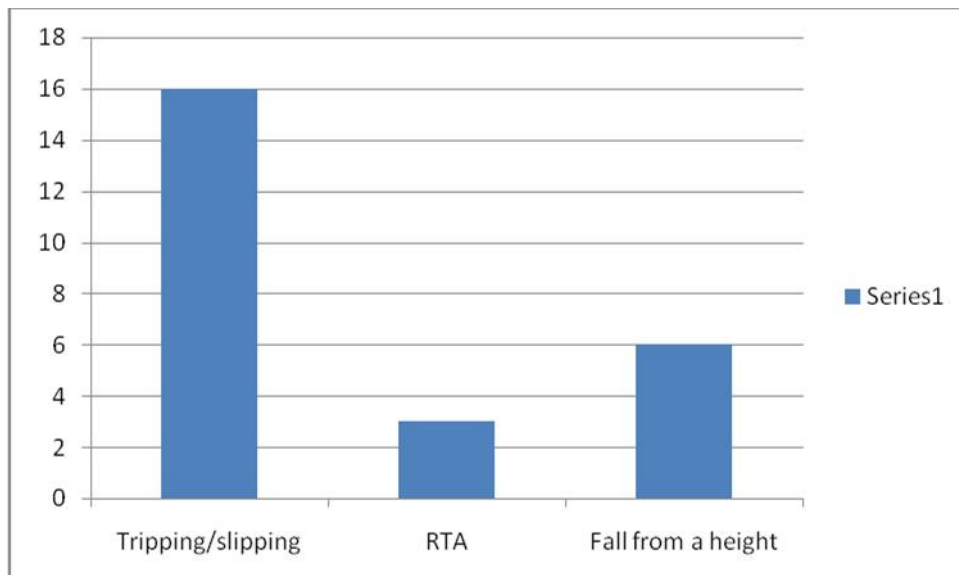


TABLE - 5 shows the time of presentation after injury.

Time to presentation	No. of patients	Percentage (%)
< 24 hrs	6	24
24 hrs - 72 hrs	9	36
72 hrs – 1 wk	7	28
>1 week	3	12

GRAPH-3 Time to presentation

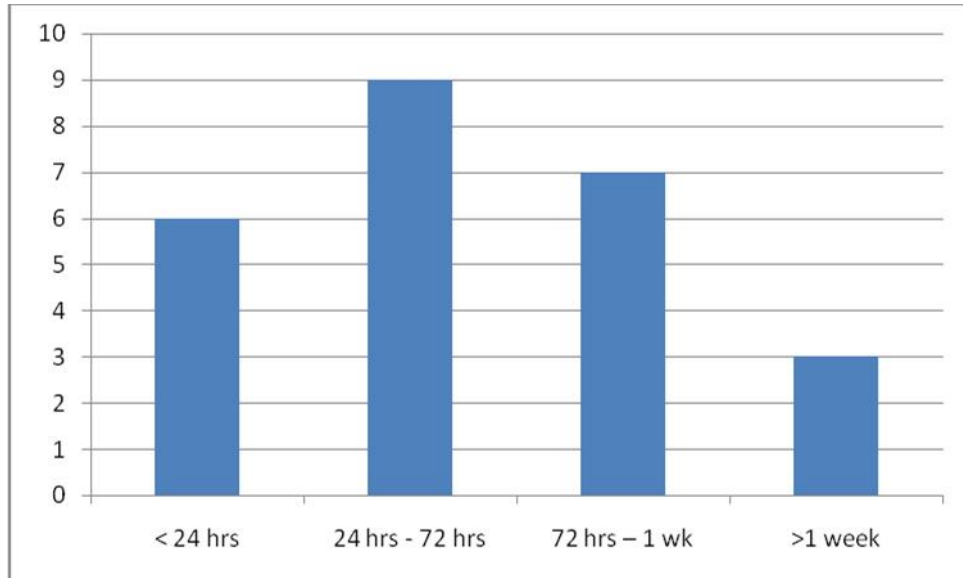


TABLE 6: Radiological type of fracture

Radiological Type	Number of Patients	Percentage (%)
Trans-cervical	21	84
Basicervical	3	12
Sub-capital	1	4

Table 6 shows that the majority of study patients (84%) had a transcervical type of fracture with 12%

patient having a basicervical and only one having subcapital fracture.

GRAPH 4 Radiological type of fracture

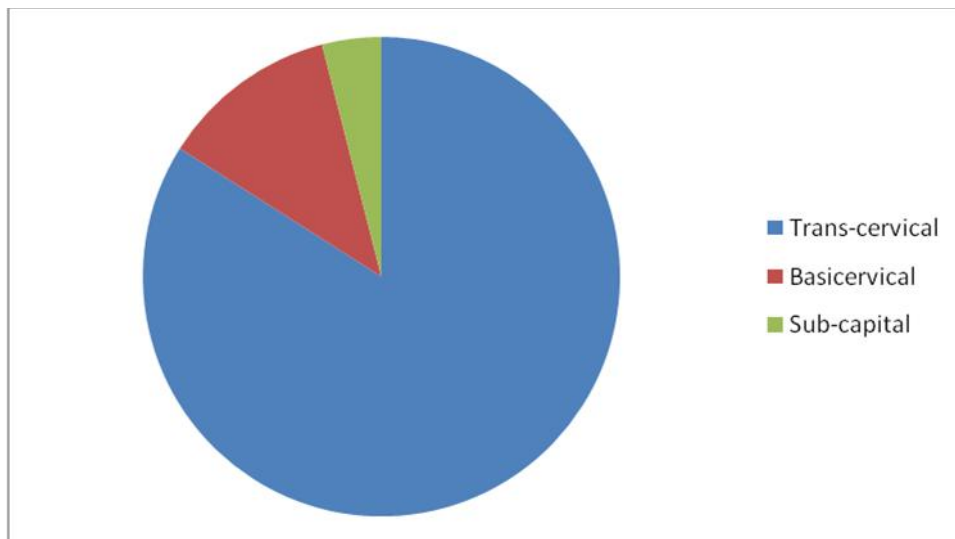


TABLE 7: Systemic co-morbidities

Systemic Co-morbidity	No. of patients	Percentage (%)
Heart Disease	4	16
Diabetes	6	24
COPD	5	20
Hypertension	8	32
Knee Osteoarthritis	3	12

Table 7 depicts that 16% of study patients had heart disease, 24% had diabetes, 20% had COPD, 32% had hypertension and 12% had ipsilateral knee osteoarthritis.

TABLE – 8: Size of prosthesis

Size of the prosthesis	No. of patients	Percentage (%)
41mm	2	8
43mm	7	28
45mm	12	48
47mm	4	16

Table 8 depicts that the most commonly used prosthesis size was 45mm followed by 43mm, 47mm and 41mm.

TABLE 9: Peri-operative complications

Peri-operative Complication	No. of patients	Percentage (%)
Technical difficulty	7	28
Post-op hypotension	2	8
Blood transfusion reaction	2	8

Table 9 depicts that the most commonly encountered peri-operative problem was technical difficulty in insertion of the prosthesis. Postoperative blood transfusion reaction patients for which blood transfusion was stopped and injection CPM was administered.

TABLE – 10: Early post operative complications

Early Complications	No. of patients	Percentage
Limb Lengthening	2	8
Superficial Infection	1	4

Limb lengthening (<1 cm) was observed in two patients (8%) postoperatively due to technical errors in the form of the prosthesis sitting proud of the calcar. Superficial infection in the form of a wound dehiscence was seen in one patient who was a diabetic.

There were no late postoperative complications like loosening, dislocation, erosion, secondary osteoarthritis, protrusio acetabuli or periprosthetic fracture.

The minimum duration of hospital stay amongst the study patients was 04 days and maximum duration was 10 days with the average being 06 days.

Follow up

All patients were followed up regularly at 6wks, 3 months and 6 months. Only the patients who completed a 6 months follow-up were included in the final analysis. The Harris Hip Scores were recorded at each follow-up visit.

Evaluation of deformities - None of the 25 study patients had fixed deformities. Two (8%) of the study patients had post-operative limb lengthening by 1 cm.

Range of Movements – The average range of movement score of the study patients was 4.83 with 9 patients (36%) having a score of 5 indicating attainment of maximum range of movements.

TABLE 11: Final Harris hip score and clinical result

Grade	Harris Hip Score	No. of patients	Percentage(%)
Excellent	90-100	9	36
Good	80-89	12	48
Fair	70-79	2	8
Poor	<70	2	8

TABLE 12: Comparison of clinical result with standard studies

Grade	Our study	Moshein ⁶	Lestrange study ⁷
Excellent	36	40	39.6
Good	48	25	31.2
Fair	8	23	15.3
Poor	8	12	13.9

Table 12 shows the comparison of the present study with standard studies. The results obtained with bipolar hemiarthroplasty in the current study are comparable with standard studies.

Discussion

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

The mean age of the patients in the present study was 65 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.

As in most standard studies, the present study also had a higher number of females with the left side more commonly affected than the right.

Diabetes was found to be the most common co-morbidity seen in 24% of the study patients. All patients had Type II Diabetes and were on oral hypoglycemic agents. They were shifted to insulin pre-operatively and blood sugar values optimized before taking up for surgery. The other co-morbid conditions seen in the order of frequency were hypertension (32 %), COPD (20%), heart disease and ipsilateral knee osteoarthritis (12%). It was observed that the post-operative rehabilitation of patients was significantly affected by the presence of the above co-morbidities (8). This also had an effect on the final functional result of the procedure (9). Similar observations have been made by Koval et al (8) and Bath (9).

All the study, patients were taken up for the surgical procedure between the 2nd and 12th day after the trauma, the average delay to surgery being 6 days. Delay in taking up for surgery was usually for optimizing the medical condition of the patient. All cases were performed on an elective basis. All the surgeries were performed under spinal or epidural anesthesia after a thorough preanaesthetic evaluation and preparation.

Technical difficulties encountered with the procedure were most often related to the operating surgeons' learning curve. The main difficulty faced was calculating the angle of the neck osteotomy which in the case of the bipolar prosthesis was more vertical as compared to the traditional Austin Moore's Prosthesis. This resulted in poor seating of the prosthesis collar on the neck and calcar. The second difficulty encountered was miscalculation of the amount of neck to be resected. Inadequate resection of the neck resulted in the prosthesis sitting proud of the calcar and subsequent limb lengthening in some cases.

In up to half of the cases, the blood loss was < 500ml for the whole procedure and in most of the others it was between 500-750ml. Only 12% of cases had a blood loss of >750 ml requiring a blood transfusion. 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 (9, 10). Most of the surgeries were completed between 90-120 minutes of starting the procedure. Similar duration of the procedure has been reported by Haidukewych, et al (11). and Drinker, et al (12). Neither the intraoperative blood loss nor the duration of the procedure had any effect on final function.

Superficial infection in the form of a wound dehiscence was seen in one patient (4%) who was a diabetic. She was managed by debridement and secondary suturing with adequate control of the diabetic status and appropriate antibiotics based on culture-sensitivity results. The infection resolved without any sequelae and there was no late reactivation of the same. Infection rate of 3.9% after bipolar hemiarthroplasty is reported by Nottage, et al (13). None of our study patients had bed sores.

The minimum duration of hospital stay amongst the study patients was 4 days and maximum duration was 10 days with the average being 6 days. Average hospital stay of 21 days with bipolar hemiarthroplasty has been reported by Lestrage (7). Drinker and Murray have reported an average hospital stay of 23 days with the same procedure (12).

There were no late postoperative complications like loosening, dislocation, erosion, secondary osteoarthritis, protrusio acetabuli or periprosthetic fracture. We are unable to comment upon long term acetabular erosion due to relative short follow up.

All patients were followed up regularly at 6wks, 3 months and 6 months. Only the patients who completed a six month follow-up were included in the

final analysis. The Harris Hip Scores were recorded at each follow-up visit.

In our study, the final Harris Hip Score as evaluated at 6 months follow-up averaged 86.13 with the maximum score being 94.11 and the minimum score being 66.63. Our results are comparable with standard studies of bipolar hemiarthroplasty performed for fracture neck femur.

All study patients were also evaluated with their level of satisfaction with the procedure and their ability to return to pre-fracture level of activity. The level of satisfaction being a subjective assessment did not correlate well with the Harris Hip Score which was an objective assessment.

Our study is not without its own shortcomings. Firstly, our duration of follow-up of 6 months is very less in assessing the longevity and functional endurance of the prosthesis used and hence come to definitive conclusions. Secondly, we have not evaluated the degree of intra-prosthetic motion at the inner bearing at each follow-up. Such studies are complicated and beyond the facilities available at our institution. Such studies are indicated because there are claims that the motion at the inner bearing reduces over time and most prostheses behave as unipolar prostheses over a period.

Conclusion

Bipolar hemiarthroplasty for fractures of the femoral neck provides better range of movement, freedom from pain and more rapid return to unassisted activity with an acceptable complication rate. The end functional results depend on the age of the patient, associated co morbidity and optimum post-operative rehabilitation. Though, out of the purview of the present study our experiences with bipolar prosthesis have been significantly better than that with Austin Moore's Prosthesis. The long term results using bipolar hemiarthroplasty needs further study for a longer period in a larger sample.

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