

STUDY OF SURGICAL MANAGEMENT OF FRACTURE NECK OF FEMUR IN ADULTS WITH BIPOLAR HEMI ARTHROPLASTY

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ABSTRACT

BACKGROUND

Fracture neck of femur are one of the most common fractures in elderly population following a trivial trauma. The goal of treatment of these fractures is restoration of pre fracture function without associated morbidity, in earliest possible time. Earlier hemiarthroplasty by using Vitallium or stainless steel was popular, practiced by Austin Moore's method which produced fairly good results. But it had its limitations in loosening and reactions at acetabulum among others. Many of the shortcomings of this procedure was overcome by a new type of prosthesis, which had the great advantage of second joint, below the acetabulum. It was named as bipolar prosthesis, since it had an outer head of metal which is stationary and this articulates with acetabulum and a second inner small metallic head articulates with the high density polyethylene (HDPE) lining the inner surface of the outer head. This prosthesis proved very useful and results are encouraging.

The aim of the study is to assess the functional outcome of Bipolar prosthesis in Intracapsular fracture neck of femur.

MATERIALS AND METHODS

This study was done in 20 patients with fracture neck of femur in government general hospital Kurnool over a period of 2 years, All of them were managed by bipolar hemiarthroplasty through posterior approach. All patients were followed up for 6 months, results were evaluated with Harris Hip Score.

RESULTS

85% of the patients had an excellent to good Harris Hip Score while 10% of the patients had a fair result and 5% had a poor result.

CONCLUSION

Bipolar hemiarthroplasty provides early mobilization, good relief of pain and good level of activities with minimal complications.

KEYWORDS

Fracture Neck of Femur, Bipolar Prosthesis, Moore's Southern Approach.

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BACKGROUND

Fracture neck of femur is one of the most common fractures in elderly population following a trivial trauma. The goal of treatment of these fractures is restoration of pre fracture function without associated morbidity, in earliest possible time. Limited and unprotected blood supply to the femoral head, the intracapsular location and severe trabecular atrophy of femoral neck are the factors that inhibit fracture healing and leads to osteonecrosis and late segmental collapse of femoral head.¹ Hemireplacement

arthroplasty involves replacing the femoral head with a prosthesis whilst retaining the natural acetabulum and acetabular cartilage. Hemireplacement arthroplasty though not a perfect substitute for the natural head, yet restores joint function and fairly achieves the goals of treatment namely minimizing mortality and morbidity of the patients with effective rehabilitation which otherwise would have had disastrous complications of recumbence in the elderly. Earlier hemireplacement arthroplasty practiced by Austin Moore's method by using Vitallium or stainless steel was popular, produced fairly good results. But it had its limitations in loosening and reactions at acetabulum etc. Many of the shortcomings of this procedure was overcome by a new type of prosthesis, which had the great advantage of second joint, below the acetabulum. It was named as bipolar prosthesis, since it had an outer head of metal which is stationary and this articulates with acetabulum and a second inner small metallic head articulates with the high density polyethylene (HDPE) lining

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the inner surface of the outer head. This prosthesis proved very useful and the results are encouraging.

MATERIALS AND METHODS

During the period September 2014 to August 2016, 20 patients who had sustained intracapsular fracture neck femur were treated using the bipolar prosthesis at Government General Hospital, Kurnool.

Inclusion Criteria

All Patients aged above 50 years with fresh and old intracapsular fracture neck of femur.

Exclusion Criteria

1. Fracture neck of femur in less than 50 years age patients.
2. Fracture neck of femur Medically unfit for Surgery.

The patients were admitted and the data was collected through detailed history taking, general physical examination, systemic examination and local examination.

Any history of associated illness was recorded. Routine blood investigations done. Radiographs of hip joint (AP view) or pelvis were taken. Patients were put on Buck's traction pre - operatively till the date of operation. Surgery was done Under spinal anaesthesia in lateral position. By Moore's southern approach (posterior approach) The hip joint is opened by a T shaped incision over posterior capsule.

The thigh and knee are flexed to 90° and internally rotated to dislocate the hip joint. The head is extracted using an extractor or by using levers. The acetabular cavity is cleared of soft tissue remnants and ligamentum teres.

The neck of the femur is cut using a sagittal saw retaining approximately 5–10 mm of calcar over lesser trochanter at an angle parallel to that of the prosthesis shoulder.

Technique of Uncemented Bipolar Hemiarthroplasty:

Next the femoral canal was reamed using the specific reamer of the prosthesis, the entry point being more laterally, so as to avoid a varus position. The reamer (rasp) is positioned in the femoral canal with 5 - 10° of anteversion while reaming. The correct size of the prosthesis as determined by measuring the extracted head with measuring gauge, is taken and trial reduction performed which should reduce or dislocate out of acetabulum with a suction sound. Then the stem of the prosthesis is placed in the proximal femur, impacted with 5-10° of anteversion till the collar is flush with calcar and reduced by traction, external rotation of the thigh and gentle manipulation of the head of the prosthesis into the acetabulum. Stability of the joint is checked by movement of hip joint in different directions. Wound is closed in layers with suction drain in situ. Sterile dressing is applied.

Technique of Cemented Bipolar Hemiarthroplasty

After preparation of proximal femur as done for uncemented procedure, thorough wash was done with normal saline, then ribbon gauge inserted into the femoral canal to make it dry. 1st generation cementing technique was done, bipolar prosthesis was inserted in 5-10 degrees of anteversion into femoral canal, pressurization was done after prosthesis well seated over calcar.

Post-Operative Protocol

During the postoperative period the patients were placed in an abduction pillow for 5-7 days.

On second postoperative day, the patients were made to sit in bed. By 3rd post-operative day patients were mobilized using walker. Full weight bearing and ambulation were allowed as tolerated. Sutures were usually removed on 14th day.

Check radiographs were obtained in all the cases. Most of the patients were discharged by the end of second week of surgery.

On discharge patients were advised not to sit cross-legged, or squat to avoid excessive loading on the prosthesis decreasing its life span. Follow up examination was done at 6 weeks, 3 months, 6 months, and thereafter. Radiographs were taken during follow up for evidence of any complications. Outcome of the surgery was assessed using Harris hip score system.

RESULTS

During the period September 2014 August 2016, 20 patients were treated for fracture neck of femur by hemi replacement arthroplasty using bipolar endoprosthesis. and were followed prospectively for 6 months. The age of the patients in the study, ranged from 50 yrs. to 80 yrs. average being 65.5 yrs. 12 (60%) of the patients are females and 8 (40%) patients are males. All injuries are due to trivial trauma. In this study, there are no associated injuries and there were no pathological fractures. 14 (70%) patients had presented with acute fracture, 6 (30%) had presented with late presentation. 70% of the fractures were on the left side. 80% of the patients were having associated medical illness. Majority of the patients needed prosthesis size between 41 mm- 45 mm. There were no intra operative complications. All patients were mobilized on 3rd postoperative day. Only one patient had postoperative superficial infection of the wound who responded well to antibiotics. Average length of hospital stay was 18.85 days. Follow up was evaluated by Harris Hip Score. At Follow up: 90% had slight or no pain. 95% had slight or no limp. 85% could walk with support. 75% could walk a distance of 1000 meters or more. 90% could climb stairs with support. Nobody had any deformity. 80% had good range of motion. 85% of the patients had an excellent to good Harris Hip Score while 10% of the patients had a fair result and 5% had a poor result.

Average Harris Hip Score was 84.75. There were no significant radiological abnormalities except one patient who had femoral stem loosening.

Age in Years	Number of Patients	Percentage
50-60	4	20%
61-70	9	45%
71-80	7	35%
Total	20	100%

Table 1. Age

Sex	Number of Patients	Percentage
Female	12	60%
Male	8	40%
Total	20	100%

Table 2. Sex

Side of Injury	Number of Patients	Percentage
Left	14	70%
Right	6	30%
Total	20	100%

Table 3. Side

Associated Diseases	Number of Patients	Percentage
Hypertension	9	45%
Diabetes Mellitus	6	30%
COPD	1	5%
Total	16	100%

Table 4. Associated Diseases

Size of Prosthesis	Number of Patients	Percentage
41 mm	7	35%
43 mm	6	30%
45 mm	5	25%
47 mm	2	10%
Total	20	100%

Table 5. Size of Prosthesis

Total Duration of Stay	Number of Patients	Percentage
2 Wks.	8	40%
2 ½ Wks.	5	25%
3 Wks.	3	15%
4 wks.	4	20%
Total	20	100%

Table 6. Total Duration of Stay

Infection	1	5%
Deep Vein Thrombosis	0	0
Pulmonary Embolism	0	0
Total	20	100%

Table 7. General Post-Operative Complications

Intraoperative Fracture Femur	0	
Dislocation	Spontaneous	0
	Trauma	0
Late Dislocation	0	

Table 8. Specific Complications

Follow Up- Among these 20 patients, all of them were followed up. The duration of follow up was 6 months.

Pain	Number of Patients	Percentage
None	7	35%
Slight	11	55%
Mild	2	10%
Moderate	-	-
Marked	-	-
Disabling	-	-
Total	20	100%

Table 9. Functional Evaluation Pain

Limp	Number of Patients	Percentage
None	12	60%
Slight	7	35%
Moderate	1	5%
Severe	-	-
Total	20	100%

Table 10. Limp

Support	Number of Patients	Percentage
None	-	-
Single cane for long walks	13	65%
Single cane for most of the time	4	20%
One Crutch	-	-
Two Canes	3	10%
Two Crutches	-	-
Not able to walk at all	-	-
Total	20	100%

Table 11. Support

Distance	Number of Patients	Percentage
Unlimited	8	40%
< 1000 meters	7	35%
< 500 meters	3	15%
Indoor Only	2	10%
Bed and Chair	-	-
Total	20	100%

Table 12. Distance Walked

Activity	Number of Patients	Percentage	
Stairs	Without Banister	5	25%
	Using Banister	13	65%
	In any manner	2	10%
	Unable	-	-
Putting on Shoes & Socks	With ease	11	55%
	With difficulty	9	45%
	Unable	-	-
Sitting	Comfortable in any chair for one hour	19	95%
	Comfortable in high chair for one hour	1	5%
	Unable to sit in any chair	-	-
Public Transportation	Able to enter	12	60%
	Unable to enter	8	40%

Table 13. Activities

Result		Number of Patients	Percentage
Excellent	90 – 100	6	30%
Good	80 – 89	11	55%
Fair	70 – 79	2	10%
Poor	< 70	1	5%
Total		20	100%

Table 14. Final Harris HIP Score

Radiological Findings	Patients
Acetabular Fit (good socket fit)	All
Femoral stem - Varus alignment	1
Femoral stem/ Canal fit (loose)	1
Calcar resorption with sinking of prosthesis	1
Loosening	0
Acetabular erosion	0
Acetabular protrusion	0
Heterotropic ossification	0

Table 15. Radiological Assessment

DISCUSSION

Intracapsular fracture neck femur are relatively common injuries among the elderly individuals. These fractures associated with geriatric problems make it terminal event in lives of elderly individuals. In order to reduce the morbidity and mortality, the aim of management should be towards making the patient mobile at an early date. Hemiarthroplasty is advocated as the best modality of management of these fracture.

The Austin- Moore endoprosthesis has been widely used in the treatment of these fracture of femoral neck. However, anterior thigh pain and acetabular protrusion are complication of the use of this prosthesis.

In the present study, twenty cases of intracapsular fracture neck femur were surgically managed by bipolar endoprosthesis. The purpose of this study is to evaluate the outcome of the management of these fractures with bipolar endoprosthesis. The data collected in this study is assessed, analysed and compared with other series and the results are evaluated.

Age Incidence- The average age incidences reported by other series are as follows-

Series	Year	Average Age (yrs.)
Launsten et al ³	1986	77.1
Gilberty ²	1983	72.5
Lestrangle ⁴	1990	79.7
Sherwani et al ⁵	1999	64.0
Present study	2016	65.5

Table 16. Age Incidence

In present study, 45% of patients are in the age group between 60-70 years. This indicates that, the average of our sample is less in comparison to western studies.

Gender- In the present study, 12 patients (60%) were females and 8 patients (40%) were males. The female preponderance in our study is similar to the female preponderance observed by various other authors.

The sex incidence reported in other series are as follows-

Series	Year	Female (%)	Male (%)
Gilberty. ²	1983	81.0	19.0
Launsten. ³	1986	77.3	22.7
Lestrangle. ⁴	1990	81.8	18.2
Sherwany. ⁵	1999	60.0	40.0
Present study	2016	60.0	40.0

Table 17. sex incidence

Size of Prosthesis- 65% of our patients required prosthesis of size that varied between 41mm - 43mm. But the study of Langen (1979) had reported that majority of has patients (82%) required prosthesis sizes between 44mm - 48 mm. The difference in the sizes required by the two study groups compared may be partly due to racial differences in the build of patients.

COMPLICATIONS

In the present study, only one patient had infection and responded well to appropriate antibiotics. The complications reported by other authors are,

Series	Year	Incidence (%)
Gallinaro et al ⁶	1990	2.3%
Nottage et al ⁷	1990	1.3%
Wetherell & Hinves. ¹	1990	0.5%
Present Study	2016	5%

Table 18. Complications

Follow Up- 20 patients were followed up for a period of 6 months.

Pain- In present study, 90% of patients had none to slight pain. Only 2 patients had mild pain in our study. This can be compared to other studies.

Series	Year	Percentage
Calder et al ⁸	1986	65%
Wethrell & Hinves. ¹	1990	95%
Labelle et al ⁹	1990	79.2%
Gallannaugh. ¹⁰	1991	96%
Sherwani et al ⁵	1999	88%
Present Study	2016	90%

Table 19. Pain

This confirms that, Bipolar endoprosthesis provides pain free hip in most of the patients.

Support- In present study, 85% of the patients could walk for long distances with single cane. This can be compared with other authors.

Series	Year	Percentage
Wether all & Hinves. ¹	1990	69%
Gallannaugh. ¹⁰	1991	66%
Presents study	2016	85%

Table 20. Support

Activities- In the present study, most of our patients did not have restriction of daily activities. All patients could climb stairs with or without the help of banister, could sit

comfortably on chair for long hours and All of them had no to some difficulty in putting on shoes & socks. Langan (1979) has reported that 61% could put on their socks and shoes.

Absence of Deformity- In the present study, there were no fixed deformities. Only 1 patient (5%) had minimal shortening of 1 cm and only one patient (5%) had minimal lengthening of 1 cm in contrast to the requirement of <3.2 cm limb length discrepancy in Harris Hip Score.

This study when compared to other authors- Gallinaro (1990) has reported <1 cm leg length discrepancy in 6.6% of his patients.

Final Harris Hip Score- In our study, the final Harris Hip Score ranged from 64 to 96 with an average of 84.75. Final Harris Hip Score of our study has been compared to other studies-

Result	Score	Present Study 2016	Sherwani 1999	Moshein. ¹¹ 1990	Lestrangle 1990	Gilberty 1983
Excellent	90-100	06 (30%)	31%	40%	39.6%	64%
Good	80-89	11 (55%)	46%	25%	31.2%	28%
Fair	70-79	02 (10%)	15%	23%	15.3%	-
Poor	<70	01 (5%)	08%	12%	13.9%	0.8%
Range	-	64 – 96	-	39-100	-	-
Average	-	84.75	82	82.4	82.6	-

Table 21. Final Harris Hip Score

Radiological Assessment- In the present study, there is one patient with varus alignment of the stem & femoral subsidence and one patient reported with femoral stem loosening.

Various authors have reported their results as follow-

	Labelle. ⁹ (1990)	Gallinaro. ⁶ (1990)	Moshein. ¹¹ (1990)	Wetherell. ¹ (1990)
Femoral Stem (Varus)	-	-	27.5%	-
Femoral subsidence	18%	-	8%	7%
Femoral loosening	24%	56.5%	-	-
Acetabular erosion	45%	0	2.3%	5.7%
Protrusion	0	0	0	0
Heterotropic Ossification	27%	82.6%	10%	-

Table 22. Radiological Assessment

CONCLUSION

The clinical data was assessed, analysed, evaluated and the following conclusions were made-

- Fracture neck femur is common in elderly population. Progressive osteoporosis is believed to be the primary force driving the increased incidence of femoral neck fracture in elderly population. These patients have been shown to have lower bone mineral densities than that of age matched controls. Another factor which is associated with this fracture is increased risk of falling in elderly population.
- Bipolar hemiarthroplasty can be safely performed in elderly population with satisfactory results.
- Bipolar hemiarthroplasty provides early mobilization, good relief of pain and good level of activities with minimal complications.
- Complications like Acetabular erosion and anterior thigh pain are less with bipolar hemiarthroplasty when compared with Austin Moore’s prosthesis

Thus, with these results, we conclude that bipolar hemiarthroplasty is the ideal treatment for intracapsular fracture neck of femur.

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