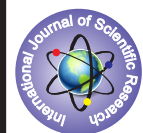


Functional and Radiological Evaluation of Intracapsular Fracture Neck Femur Treated With Cemented Bipolar Prosthesis in Elderly Patients.



Orthopaedic

KEYWORDS: Fracture neck femur, cemented bipolar prosthesis.

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ABSTRACT

Introduction: Cemented bipolar prosthesis is a safe treatment for femoral neck fracture in elderly patient, the use of cement in bipolar prosthesis when treated a displaced femoral neck fracture in elderly patients. The

primary hypothesis of this study was that the use of cement would afford more secure fixation, better analog pain and activity scores in elderly patients.

Material and Method : 30 patients of intracapsular femoral neck fracture are admitted to Orthopaedics Department, RNT Medical College & MB Govt. Hospital, Udaipur were taken for this study. This is a prospective study from Dec. 2014 to Dec. 2016.

Results : The results were analysed using the Harris hip score, which is based on the parameters of pain, function, range of motion, absence of deformity, the results were graded as excellent, good, fair and poor. In our study all patients were available at the time of final follow-up. The result was excellent in 12 (40%), good in 11 (36.66%), fair in 4 (13.33%) and poor in 3 (10%) patients. Overall, 23 (76.7%) out of 30 patients showed good to excellent results and only 7 (23.3%) patients has fair or poor result.

Conclusion: cemented bipolar prosthesis is a better treatment option for the intracapsular fracture neck of femur in elderly patients as it help in early mobilization thus, preventing complication associated with fracture in this age group. Patients treated with cemented bipolar prosthesis have better functional outcome in intracapsular femur neck fracture with used of as per Harris Hip score like less residual pain, better walking ability, better range of motion, less deformity, less cement and surgery related complication.

INTRODUCTION

Cemented bipolar prosthesis is a safe treatment for femoral neck fracture in elderly patient, the use of cement in bipolar prosthesis when treated a displaced femoral neck fracture in elderly patients. The primary hypothesis of this study was that the use of cement would afford more secure fixation, better analog pain and activity scores in elderly patients. Walking ability and pain scores were better in the cemented bipolar prosthesis in the early follow-up period. The use of cement during bipolar prosthesis in patients over 65 years of age had no negative impact on mortality or morbidity. Hemodynamic changes during cement application are important, but it is noteworthy that patients fitted with cemented prosthesis had increased level of activity and lower pain levels.

AIMS AND OBJECTIVES

A prospective study to evaluate functional and radiological results and complications of intracapsular femoral neck fracture treated with cemented bipolar prosthesis in elderly patients.

MATERIAL AND METHODS

SOURCE OF DATA

Patients who have sustained an intracapsular femoral neck fracture and are admitted to Orthopaedics Department, RNT Medical College & MB Govt. Hospital, Udaipur. This is a prospective study from Dec. 2014 to Dec. 2016.

No. of cases: 30

INCLUSION CRITERIA:

1. Patients more than 60 years of age with Fresh fractures including all cases reported within three weeks of injury.
2. Neglected fractures: All those coming after three weeks of injury and who have taken no treatment.

EXCLUSION CRITERIA:

1. Intracapsular fracture neck femur below 60 years.
2. Patients with arthritic changes involving the acetabulum
3. Fracture neck of femur associated with fracture shaft of femur trochanteric fracture and Acetabulum fracture.
4. Pathological fractures.

Surgical technique:

Pre operative care: Preoperatively patients were kept on below knee skin traction and encouraged to do static quadriceps and deep breathing exercises.

Patients were evaluated properly. X-ray of involved hip were taken in AP view with 15° internal rotation and Lateral view.

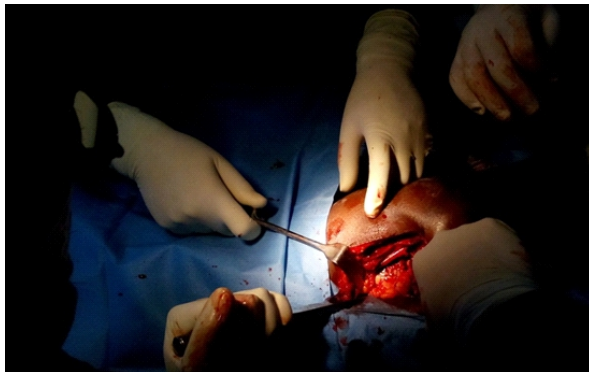
Surgical Approach – Moore's posterior approach to the hip



LATERAL POSITION FOR MOORE'S APPROACH TO THE HIP

patient was placed on the lateral position on the operative table with the affected side facing up. A curved incision is taken from 8 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 is then directed distally 5-8 cms along the femoral shaft. The deep fascia is exposed and divided in line with the skin incision. By blunt dissection the fibers of the gluteus maximus are separated taking care not to disturb the superior gluteal vessels in the proximal part of the exposure. The gluteus maximum muscle is split and short external rotators are exposed. Stay sutures are applied to the short external rotators, and a tenotomy of the short external rotators is done close to their insertion on the inner surface of the Greater trochanter. The short external rotators are retracted to protect the sciatic nerve and expose the posterior hip capsule. The capsule is incised by an inverted

T-shaped incision, and the hip flexed, adducted and internally rotated to dislocate the hip joint. Using a head extractor and bone levers, head is delivered out of the acetabulum and the acetabulum is cleared of debris. The size of the extracted head is measured by using measuring gauze, and the size of prosthesis is selected.



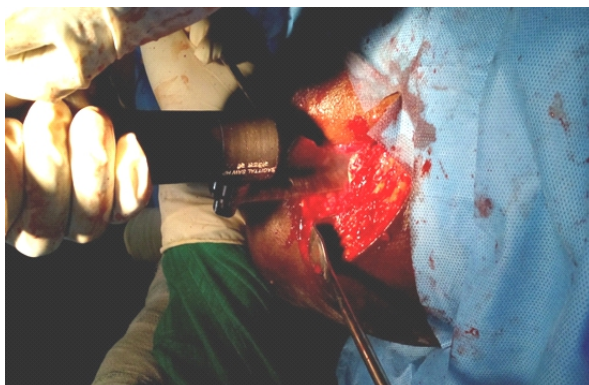
EXPOSURE OF THE FRACTURE SITE



REMOVAL OF HEAD OF FEMUR



MEASUREMENT OF HEAD SIZE



OSTEOTOMY OF THE FEMORAL NECK

The neck is trimmed leaving 1cm medial calcar, on which the shoulder of the prosthesis would eventually sit. The proximal femur was reamed with rasp, the length of the rasp corresponding to the stem of the prosthesis. The direction of the insertion of the rasp for was ascertained by using the lesser trochanter as a guide to achieve correct seating of the prosthesis in 10-15° anteversion.

Insertion of the cemented bipolar prosthesis

The appropriate- sized good cement mantle around the bipolar 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 bone cement was allowed to set, following which the hip joint was reduced by gentle traction with external rotation of the hip and simultaneous manipulation of the head of the prosthesis into the acetabulum. The final seating of the prosthesis is by gentle blows with the help of a mallet and the insertor. The range of movement in all directions is checked by taking the joint through the whole range of movements. The stability of the prosthesis and its tendency to dislocate is checked by flexing and adducting the hip. The limb is kept in slight abduction and external rotation for suturing the wound. Great care is taken to achieve adequate closure of the posterior capsule and anatomical reattachment of the short external rotators. The rest of the wound is closed in layers over a suction drain placed beneath the gluteus maximus.



INSERTING THE CEMENTED BIPOLAR PROSTHESIS IN THE RIGHT VERSION

Followup:

Patients were followed up personally. Information was collected by reviewing case sheets, operation notes and follow up in post operative period from patients old records, case sheets will be collected from their relatives.

For follow up patients were initially called up after one month for the first three months and after that once at six months.

Clinical assessment:

The clinical assessment of patients was done on the basis of modified Harris hip score(1969). Based on this reasoning a point scale with a maximum of 100 points will be used with the following maximum possible scores.

OBSERVATIONS

The present study is a prospective study. During the period between Dec 2014 and Dec 2016, 30 patients were treated with cemented bipolar prosthesis for fracture neck of femur at the M.B. Govt. Hospital, attached to R.N.T.Medical College, Udaipur. 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 30 cases, all patients were available for follow up till six month which was taken as a basic pre-requisite for inclusion in the study.

TABLE – 1 (AGE DISTRIBUTION)

Age in years	No. of patients	Percentage
61-70	10	33.33%
71-80	9	30.00%
81-90	7	23.33%
91-100	4	13.33%
Mean age	72	

Table-1 shows the age distribution pattern of the patients. The average age was noted to be 72 years. The youngest patient in the study was 61 years and the oldest was 100 years.

TABLE 2 (SEX DISTRIBUTION)

Sex	No. of patients	Percentage
Male	13	43.33%
Female	17	56.66%

Table-2 shows the sex distribution pattern of the study patients. Most of the patients were found to be women (56.66%)

TABLE – 3 (RADIOLOGICAL TYPE OF FRACTURE)

Radiological Type	Number of Patients	Percentage
Trans-cervical	26	93.33%
Basicervical	2	3.33%
Sub-capital	2	3.33%

Table 4 shows that the majority of study patients (26) had a transcervical type of fracture with two patients each having a basicervical and subcapital fractures each

TABLE – 4 (MODE OF INJURY)

Mode of injury	No. of patients	Percentage
Tripling	16	53.33%
RTA	8	26.66%
Fall from height	6	20.00%

Table-5 depicts the mode of injury causing the fracture of the neck of femur.

53.33% of the patients sustained the injury by tripping or slipping, 26.66% due to an RTA and the remaining 20% by a fall from a height

TABLE 5 (SHOWING INCIDENCE OF INTRAOPERATIVE COMPLICATIONS TREATED BY CEMENTED BIPOLAR)

Complications	
Intraoperative severe decrease in BP during preparation of canal [n(%)]	1 (3.33%)
Intraoperative cardiac arrest [n(%)]	1 (3.33%)
Duration of surgery	30 minutes
Blood loss	200 ml

TABLE 06 (SHOWING INCIDENCE OF EARLY POSTOPERATIVE COMPLICATIONS TREATED BY CEMENTED BIPOLAR)

Complications	No. of patients	Percentage
Hypoxia	0	0
Hypotension	0	0
Cardiac arrhythmia and arrest	0	0
Bronchospasm	0	0
Adverse tissue reaction	0	0
Limb Lengthening	2	6.66%
Superficial Infection	1	3.33%

Limb lengthening (2CM) was observed in 2 patients (6.66%) 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 1 patient (3.33%).

TABLE 07 (SHOWING INCIDENCE OF LATE POSTOPERATIVE COMPLICATIONS TREATED BY CEMENTED BIPOLAR)

Complications	No. of patients	Percentage
Dislocation	0	0
Implant loosening (aseptic)/ osteolysis	0	0
Sinking of stem and micromotion	0	0
Malposition -Antiversion, retroversion	0	0
Varus	0	0
Implant broken	0	0
Revision	0	0
Reoperation	0	0
Acetabular erosion	0	0
Heterotrophic new bone formation	0	0
Superficial Infection	1	3.33%
Protrusion acetabuli	0	0

LATE POSTOPERATIVE COMPLICATIONS

There were late postoperative complications like loosening in 2 (6.66%) and superficial and deep infection (serous discharge) in 1 (3.33%) patient.



Loosening of stem of cemented bipolar prosthesis

Gait Analysis – 27 (90%) of the study patients had slight limp while 3 patients (10%) had a moderate limp. At the end of six months, 16 patients (53.33%) were found to be ambulating without the help of any support and the remaining 14 patients (46.66%) needed some support in the form of a cane or walker for long walks. 18 (60%) of the study patients could walk an unlimited distance at any given point of time while rest could walk only a limited distance.

Activity – On evaluation of the patients ability to climb stairs it was found that 9 patients (30%) were able to climb stairs without the use of any support or railing while the remaining 21 patients (70%) were able to do so with the support of the railing. Since majority of the study 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 19 patients (63.33%) were able to trim their toe nails without any difficulty while 11 patients (36.66%) found it difficult to do so. With regards to the ability to sit for a long duration it was found that all of the study patients were able to sit comfortably on a chair for up to one hour. 23 (76.66%) of the study patients were able to enter and use public transport for commuting, rest 7 (23.33%) unable to enter public transport

Evaluation of deformities - None of the 30 study patients has fixed deformities. Two (6.66%) of the study patients had post-operative limb lengthening by 2 cm.

Range of Movements – The average range of movement score of the study patients was 4.63 with 17 patients (56.66%) having a score of 5 indicating attainment of maximum range of movements.

FINAL HARRIS HIP SCORE AND CLINICAL RESULT

In our study, the final Harris Hip Score as evaluated at six months follow-up averaged 83.23% with the maximum score being 95 and the minimum score being 67. Overall, 12 patients (40%) achieved Excellent result, 11 patients (36.66%) achieved Good result, 4 patients (13.33%) achieved fair result and 3 patients (10%) achieved

poor result.

DISCUSSION

The aim of cemented bipolar prosthesis in intracapsular femoral neck fracture is early return to daily activities and reduced postoperative pain. 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 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. 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. Majority of our study patients (53.33%) sustained the injury due to a trivial trauma like tripping or slipping. This is a very common occurrence in elderly population where poor vision, lack of neuromuscular coordination and senile osteoporosis is a problem. Most of such injuries can be classified as "indirect" trauma. 20% of our study patients sustained the injury due to a fall from a height and 26.66% due to a Road Traffic Accident.

A little more than half of our study patients were brought to the hospital within three days of sustaining the injury. 40% of the patients were brought to the hospital within 24 hours of the injury while 26.66% presented for treatment within 24 hrs–72 hrs. One-fourth of our study patients (23.33%) were brought to the hospital between 72 hrs–1 wk and the remaining 10% presented for treatment after one week. This is a common scenario in our country where patients present to a doctor much late given the seriousness of the condition. Difficulty in post-operative rehabilitation was particularly noticed in the subset who presented after 1 week.

All of our study patients had a displaced fracture of the neck of femur. Majority of the patients (93.33%) had a trans-cervical fracture while two patients each had a basicervical and sub-capital fracture each. The anatomical type of fracture and the displacement did not have any bearing on the final function. Diabetes was found to be the most common co-morbidity seen in 30% of the study patients. All patients had Type II Diabetes and were on oral hypoglycaemic 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 (20%), COPD (23.33%), heart disease and Ipsilateral knee osteoarthritis (10%). It was observed that the post-operative rehabilitation of patients was significantly affected by the presence of the above co-morbidities. This also had an effect on the final functional result of the procedure. Similar observations have been made by Koval et al. and Bath.

The size of the prostheses used, in general matched well with the preoperatively measured size of the head as assessed by X-rays. In 50% of the cases 45 mm prostheses were used. This was followed in frequency by 43 mm (33.33%), 47 mm (6.66%) and 41 mm (10%) prostheses in the order of frequency. The rasps used for broaching the canal were part of the instrumentation that came with the prosthesis. The advantage was that the rasp corresponded to the exact length and width of the prosthesis which prevented any additional rasping of the canal and subsequent loose seating of the prosthesis. All the prostheses were inserted by press fit technique and did not require any additional augmentation with cement.

Most of our study patients were mobilized in bed on day one of surgery and with weight bearing as tolerated within the 72 hours postoperative period after drain removal. Delay if at all was due to medical reasons.

Limb lengthening (2 cm) was observed in two patients (6.66%)

postoperatively due to technical errors in the form of the prosthesis sitting proud of the calcar. Superficial infection was seen in 1 patient (3.33%).

The minimum duration of hospital stay amongst the study patients was 10 days and maximum duration was 24 days with the average being 16 days. Average hospital stay of 21 days with cemented bipolar prosthesis has been reported by Lestrange. Drinker and Murray have reported an average hospital stay of 23 days with the same procedure.

There were no late postoperative complications like dislocation, erosion, secondary osteoarthritis, protrusion 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 six months 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 six month follow-up averaged 83.23% with the maximum score being 95 and the minimum score being 67. Overall, 12 patients (40%) achieved Excellent result, 11 patients (36.66%) achieved Good result, 4 patients (13.33%) achieved fair result and 3 patients (10%) achieved poor result. Overall, 76.66% of the patients achieved an excellent or good result. Our results are comparable with standard studies of bipolar prosthesis 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. 12 patients (40%) were 'very satisfied', 14 (46.66%) were 'fairly satisfied' and 4 (13.33%) 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. Our study is not without its own shortcomings. Firstly, our duration of follow up of six month 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 of time.



Table .. Comparison of results of cemented bipolar prosthesis present series with other studies

S.No.	Author (year) (n=no. of patients)	Bipolar prostheses	Excellent	Good	Fair	Poor
1	McConville et al (1989) (n=100)	70	16(22.90 %)	37(52.90 %)	04(05.70 %)	13 (18.50)

2	Vazquez-vela et al (1990) (n=400)	400	230 (57.50%)	140 (35.00%)	08 (02.00%)	22 (05.50%)
3	Ito et al (2000) (n=48)	48	08(16.67 %)	22(45.83 %)	04(8.33 %)	14(29.17 %)
4	Present series(n=30)	30	12(40%)	11(36.66 %)	04(13.33 %)	03(10%)

Table .. Comparison of mean Harris Hip Scores (HHS) in (Bipolar prosthesis) pre and postoperatively in various studies

S. No.	Author (year) (n=no. of patients)	No. Bipolar prosthesis	Mean Harris hip score		
			Preop.	Postop.	Difference
1	McConville et al(1989) (n=100)	70	—	78.80	—
2	Sanjay et al(1996) (n=26)	26	36.00	88.80	52.00
3	Ito et al(2000) (=48)	48	46.00	86.00	40.00
4	Present series(30)	30	-	83.23	-

SUMMARY AND CONCLUSION

During the period between Dec. 2014 to Dec. 2016, 30 patients were treated with cemented bipolar prosthesis for fracture neck of femur at the M.B .Govt. Hospital attached to R.N.T. Medical College, Udaipur. Patients were followed up for an average period of 6 months and results were analysed using the Harris hip score system.

- The average age of the study patients was 72 years with involvement of the left side in 56.66%.
- The results were analysed using the Harris hip score, which is based on the parameters of pain, function, range of motion, absence of deformity, the results were graded as excellent, good, fair and poor. In our study all patients were available at the time of final follow-up. The result was excellent in 12 (40%), good in 11 (36.66%), fair in 4 (13.33%) and poor in 3 (10%) patients. Overall, 23 (76.7%) out of 30 patients showed good to excellent results and only 7 (23.3%) patients has fair or poor result.
- There was two cases of limb lengthening 2cm.
- cemented bipolar prosthesis is a better treatment option for the intracapsular fracture neck of femur in elderly patients as it help in early mobilization thus, preventing complication associated with fracture in this age group. Patients treated with cemented bipolar prosthesis have better functional outcome in intracapsular femur neck fracture with used of as per Harris Hip score like less residual pain, better walking ability, better range of motion, less deformity, less cement and surgery related complication.
- The end functional results depend on the age of the patient, associated comorbidity and optimum post-operative rehabilitation.

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