

A PROSPECTIVE STUDY TO EVALUATE THE FUNCTIONAL OUTCOME IN FRACTURE NECK OF FEMUR TREATED BY CEMENTED MODULAR BIPOLAR HEMIARTHROPLASTY IN ELDERLY PATIENTS

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Abstract

Background: Fracture neck of femur has a major share among all the hip fractures. It is common in the elderly age group with female preponderance and may be associated with other injuries as well. It is usually the result if trivial trauma in the elderly patients. Bipolar prosthesis provided greater range of hip motion, faster walking speed, reduced incidence if postoperative pain, acetabular erosion, loosening of stem, rapid return to normal activity as compared to unipolar prosthesis. Cementing the prosthesis affords more secure fixation and may result in less postoperative mid thigh pain and a reduced long term revision. The goal of the treatment is restoration of pre fracture function and preventing the associated morbidity and mortality. **Materials and Methods:** The study is a clinical, prospective and observational study conducted at SSIMS &RC hospital. After obtaining a detailed history, complete general physical and systemic examination, the patients were subjected to relevant investigations. The complete data were recorded in a specially designed case recording proforma. The data collected was transferred into a master chart which is subjected to statistical analysis. Finally, after the diagnosis, the patients were selected for the study depending on the inclusion and exclusion criteria. Post-operatively all cases were followed up for a minimum period of 6 months. Clinical assessment of results of study were done based on Modified Harris Hip Score. **Result:** Data was collected based on detailed patient evaluation with respect to history, clinical examination and radiological examination. Out of the 30 cases, all patients were available for follow up till one year which was taken as a basic pre-requisite for inclusion in the study. In our study, the final Harris Hip Score calculated at the end of one year follow-up averaged 85.4 with the maximum score being 94.3 and the minimum score being 38. Our study data showed that 9 patients (29.7%) achieved excellent result at the end of 1 year of the surgery, 15 patients (49.5%) achieved Good result, 5 patients (16.5%) achieved fair result and 1 patient (3.3%) achieved poor result. Overall, 79% of the patients achieved an excellent or good result. Our results are comparable with standard studies done in context of NOF fractures treated with cemented bipolar hemiarthroplasty. Our duration of follow-up being one year is short enough in assessing the longevity and endurance of the modular bipolar prosthesis used. **Conclusion:** Cemented Modular Bipolar Hemiarthroplasty for femoral neck fractures in the elderly patients permits early return to pre-morbid life as it provides better range of movement, freedom from pain.

INTRODUCTION

Hip fractures most often affect the elderly and have a tremendous impact on both the health care system and society in general. In human beings any affection of the hips is of much concern since it offers locomotion.^[1]

In elderly, NOF fractures are associated with low energy falls and in younger patients the cause is usually secondary to high-energy trauma such as a fall from a substantial height or RTA.^[2] Risk factors for femoral neck fractures include female gender, decreased mobility, and low bone density.^[3,4]

The life time risk of sustaining a hip fracture is 9% for a female of the age of 50, but this rises to 12% by the age of 70 and 18% by the age of 90 years and in men 2%, 4% and 8% respectively.^[5]

In Hemiarthroplasty (HA), femoral head is replaced and the natural acetabulum is retained.^[6]

In modular bipolar prosthesis the primary articulation is at the inner bearing of the prosthesis and not at prosthesis-cartilage interface, hence decreasing the amount of acetabular erosion and pain that the patient encountered and better range of motion (ROM).^[6-9]

The large, retrospective, cohort study conducted by Niall P.T Sullivan et, al concluded that the low dislocation rate is significantly better than previously published results with other devices. This may be related to modularity of the device, and the ability to better restore length, offset, and soft tissue tension.^[7]

The meta-analysis of cemented and uncemented bipolar hemiarthroplasty conducted by Mengyu Fu et, al. showed that lower incidence of periprosthetic fractures, aseptic loosening of prosthesis, intra-operative fractures, wound infections and re-operation.^[8]

In these patients treatment with primary cemented hemiarthroplasty could perhaps return the patients to their pre injury level of activity more quickly, thus obviating the post operative complications caused by immobilization or failure of the implant.^[9,10]

The hurdle for this procedure is cost, since the cost of modular bipolar is more when compared to other implants surgeon needs to consider as an option.

The purpose of this study is to assess the functional outcome and quality of life scores and complications in elderly osteoporotic patients with fracture of the femoral neck treated by cemented hemiarthroplasty using modular bipolar prosthesis.

MATERIALS AND METHODS

Source of Data

The study was conducted on patients diagnosed with femoral neck fractures seen as out patients and in patients in S. S Institute of medical sciences and research center, Davanagere for 2 years. i.e., from July 2021 to July 2023

Method of collection of data: The study is a clinical, prospective and observational study conducted at SSIMS-RC hospital. After obtaining a detailed history, complete general physical and systemic examination, the patients will be subjected to relevant investigations. The complete data was recorded in a specially designed case recording proforma. The data collected was transferred into a master chart which is subjected to statistical analysis. Finally after the diagnosis, the patients are selected for the study depending on the inclusion and exclusion criteria. Post-operatively all cases was followed up for a minimum period of 6 months.

Clinical assessment of results of study was done based on Modified Harris Hip Score.

Inclusion criteria

1. Patients with fracture neck of femur.
2. Elderly patients of age 60 years and above
3. Elderly patients with failed internal fixation
4. Patients medically fit for surgery

Exclusion criteria

1. Patients below 60 years of age
2. Patients with arthritic changes involving the Acetabulum
3. Non ambulatory patients prior to surgery.
4. Patients medically unfit for surgery.
5. Patients not willing for surgery.

Operative procedure: 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 maximus 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 a 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 correct size of prosthesis is selected. The neck is trimmed leaving 1cm medial calcar. The femoral canal is reamed with increasing sizes of the reamers. The proximal femur was reamed with a rasp, the length of the rasp depends upon to the size of the prosthetic stem to be used. After cortical reaming is done, broaches are placed precisely. The fit of the broach within the canal is assessed.

The direction of the insertion of the rasp and trial implants was ascertained by using the lesser

trochanter as a guide to achieve correct seating of the prosthesis in 10- 15° anteversion. Then appropriate size of femoral head and bipolar head trial implants was fitted over the trial stem and whole assembly was reduced, and stability and limb length was checked. Once the reduction was satisfactory, the trial implants are replaced with original prosthesis.

Cementization was done using 40mg bone cement in standard manner.

The appropriate sized prosthesis (as measured from trial implants) is inserted into the reamed cement filled canal taking care to place it in 10-15° of ante version. Prosthesis held in place till cement sets. Then appropriate head is fixed to the selected femoral cup component. The head component is then fitted to stem. Then the hip joint is reduced by gentle traction with external rotation of the hip and simultaneous manipulation of the head of the prosthesis into the acetabulum. 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 of the posterior capsule and anatomical reattachment of the short external rotators. Layer by layer closure is done and a suction drain is placed beneath the gluteus maximus. Hemostasis is maintained throughout the procedure. Skin closure was done with help of staples.



Figure 1: Lateral decubitus position Neck resection Prosthesis fitting

RESULTS

Table 1: Age, Sex, Side distribution & Mode of trauma

	Number
Total no. of patients	30
Age distribution	
60 - 69 years	18
70 - 79 years	8
80 years and above	4
Sex distribution	
Male patients	4
Female patients	26
Side involved	
Left side fracture	18
Right side fracture	12
Types of trauma	
High energy trauma	2
Low energy trauma	28

Table 2: Final Harris hip score and clinical results

Grade	Harris hip score	No. of patients	Percentage
Excellent	90 - 100	9	29.7
Good	80 - 89	15	49.5
Fair	70 - 79	5	16.5
Poor	< 70	1	3.3

Table 3: Complications

Complications		
Intraoperative complications	Hypotension	2
	Blood transfusion reaction	1
Early postoperative	Limb lengthening	2
	Surgical site infection	0
Late postoperative	Implant dislocation	0
	Periprosthetic fracture	0



Pre operative x ray Post operative x ray



Clinical pictures

DISCUSSION

Haentgens et al reported that in patients treated with arthroplasty, rehabilitation was easier and faster and the incidence of pressure sores, pulmonary infection and atelectasis were significantly lower.

Fracture neck of femur is a challenge to operate for an orthopaedic surgeon due to variable results when different modalities of treatment are used such as osteosynthesis or hemiarthroplasty. As osteosynthesis is not a good option for elderly population, therefore prosthetic replacement with bipolar prosthesis has become a procedure of choice among surgeons specially in elderly neck of femur fracture patients. As loosening of implant in elderly patients due to osteoporosis which clinically presents as thigh pain is a major problem after AMP surgery and uncemented bipolar prosthesis surgery. This can be prevented by using cemented bipolar prosthesis procedure. In this study the mean age of the patients was 65 years.^[11] In this study more number of females were seen with the left side more commonly affected than the right. Transcervical fracture was the most common type of fracture in this study.

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 – 750 ml. Only 10% of cases had a blood loss of > 750ml requiring a blood transfusion. Most of the surgeries were completed between 92 – 120 minutes from the skin incision. Similar duration of the procedure has been reported by Haidukewych, et al and Drinker, et al. Neither the intraoperative blood loss nor the duration of the procedure had any effect on final function.

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

Limb lengthening (< 1cm) was observed in 2 patients.

Superficial infection in the form of a wound dehiscence was seen in 1 patient, it healed after few

days by its own without intervention. But no deep infection in any patients. None of our patients had bed sores.

In our study the final Harris Hip Score calculated at the end of one year follow-up averaged 85.20 with the maximum score being 93 and the minimum score being 65.8. Our study data showed that 9 patients (29.7%) achieved excellent result at the end of 1 year of the surgery, 15 patients (49.5%) achieved Good result, 5 patients (16.5%) achieved Fair result and 1 patient (3.3%) had Poor result. Overall, 79% of the patients achieved an excellent or good results.

CONCLUSION

In fracture neck of femur of the elderly with osteoporosis, cemented bipolar hemiarthroplasty is one of the best options. The modular bipolar prosthesis gives surgeon more freedom to choose the exact size of prosthesis. This study as is shown in other similar studies stresses that cemented modular bipolar hemiarthroplasty gives good results than cemented bipolar hemiarthroplasty. Cemented modular bipolar hemiarthroplasty for femoral neck fractures in the elderly permits early return to pre-morbid life as it provides better range of movement, freedom from pain.

Modular bipolar prosthesis is surgeon friendly, as surgeon can choose exact size of stem head and neck increments. Intraoperative complications like difficulty in reduction due to size not matching as the broach size is eliminated in this procedure to modular design of bipolar prosthesis.

The long term results using modular cemented bipolar hemiarthroplasty needs further study for a longer period in a larger sample as our study has less number of patients and conducted for lesser duration.

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