

A PROSPECTIVE STUDY OF SURGICAL MANAGEMENT OF FRACTURE NECK OF FEMUR IN ADULTS WITH CEMENTED BIPOLAR HEMIARTHROPLASTY

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Received: 05 January 2024, Revised and Accepted: 25 February 2024

ABSTRACT

Objectives: Displaced femoral neck fractures are frequently treated with bipolar hemiarthroplasties. There is little long-term data regarding bipolar hemiarthroplasty. This study aims to know the clinical efficacy of bipolar hemiarthroplasty in fractured neck femur in old age people. Patients are assessed postoperatively for pain, limp, and functional activities, and a Harris hip score is used to evaluate the results.

Methods: This is a prospective study that included patients who underwent bipolar hemi replacement arthroplasty. A total 40 number of patients treated with bipolar prosthesis were assessed during our study. Both males and females were included in the study. We obtained all proper consent from patients during the study from a tertiary care hospital.

Results: In this study, a sample of 20 patients with fractures of the neck of the femur with displacement, communication, and neck resorption above 50 years old were surgically treated with hemiarthroplasty using a bipolar endoprosthesis. Postoperatively, bipolar hemiarthroplasty allows for early mobilization, pain alleviation, and a high degree of activity while posing little risks.

Conclusion: When compared to Austin Moore's prosthesis, bipolar hemiarthroplasty had fewer complications, such as acetabular erosion and anterior thigh pain. As a result of these findings, we believe that bipolar hemiarthroplasty is the best treatment for intracapsular fracture neck femur.

Keywords: Austin Moore's prosthesis, For intracapsular fracture neck femur, Bipolar hemiarthroplasty, Harris hip score.

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INTRODUCTION

The hip joint is a ball-and-socket articulation formed by the articulation of the head of the femur with the acetabulum. The acetabulum cavity is deepened by a fibro cartilaginous rim called the acetabular labrum. The uncemented hemiarthroplasty may result in higher hip scores but appears to carry a high risk of later femoral fractures [1]. Fracture of the neck of the femur occurs predominantly in the older population, typically results from low-energy falls, and may be associated with osteoporosis. Fracture of the femoral neck in the young is a very different injury and is treated in very different ways. A high-energy mechanism is the cause of fracture in young patients, and associated injuries are common. Most femoral neck fractures are intracapsular and may compromise the tenuous blood supply to the femoral head. Primary cervical femoral neck fractures are extracapsular femoral neck fractures, and ten are considered intertrochanteric femoral fractures. The Garden classification is based on the degree of Valgus displacement. Type I: Incomplete/valgus impacted. Type II: Complete and non-displaced on A.P. and lateral views. Type III: Complete with partial displacement; the femoral head's trabecular pattern does not align with the acetabulum's. Type IV: Completely displaced; this is the sort of bipolar prosthesis that we employed in our study. It has a stem that measures 160 mm in length and 8 mm in thickness. Stainless steel 316L was used to make the stem. It features a vertical shoulder attached to the medial calcar – the neck measures 19 in diameter. The inner head is 26/28 mm in diameter and articulates with the metallic (stainless steel) acetabular cup's ultra-high molecular weight polyethylene (UHMWPE) liner. The acetabular cup is available in sizes ranging from 39 to 53 mm, with a 2 mm difference between sizes. The acetabular component and femoral head are pre-assembled at the time of production.

METHODS

Twenty patients with intracapsular fractures of the neck of the femur were treated with the bipolar prosthesis at Government General Hospital, Kurnool, between November 2021 and November 2022. The study was conducted in a tertiary care institute during the study period. The study was conducted after taking proper consent from patients.

Criteria for inclusion

The following criteria were included in the study:

1. Patients over the age of 50
2. History of trauma (road traffic accidents, slip, fall, and trivial trauma)
3. Transcervical and subcapital fractures with displacement and comminution.

Criteria for exclusion

The following criteria were excluded from the study:

1. Intracapsular fracture of the femur neck in those under the age of 50
2. Primary cervical fractures of the femur
3. Compound fractures of the neck of the femur
4. Patients who are medically unfit to have surgery
5. Pathological fractures.

The patients were admitted, and a thorough medical history, general physical examination, systemic examination, and local examination gathered data.

Any previous medical history was logged. Blood tests such as Hb percent, B.T., CT, and complete urine examination (albumin, sugar, and microscopy) were performed as part of the routine. FBS, PPBS, Blood urea, serum creatinine, blood grouping, Rh typing ECG, and other tests are also available. X-rays of the abdomen and chest were obtained. To

determine the type of fracture, quantify the head size, and determine the quantity of calcar, radiographs of the hip joint (A.P. view) or pelvis were taken with internal rotation of the affected limb.

Surgical procedure

The patient is positioned in a lateral posture on the unaffected side under spinal anesthesia, and thorough scrubbing and draping are performed. The incision is made around 10 cm distal to the posterior superior iliac spine and continued distally and laterally parallel to the gluteus maximus fibers to the posterior edge of the greater trochanter using Moore's southern approach. The incision is made 10–13 cm distally, parallel to the femoral shaft. In conjunction with the skin incision, the deep fascia is separated. The gluteus maximus fibers are split by blunt dissection, avoiding damage to the superior gluteal arteries in the proximal region. The gluteus maximus proximal fibers are withdrawn proximally, exposing the greater trochanter, whereas the distal fibers are retracted distally. The sciatic nerve is carefully located and withdrawn. The capsule is revealed after the short external rotators are identified, and sutures are inserted. A T-shaped incision is made over the posterior capsule to open the hip joint. To dislocate the hip joint, the thigh and knee are flexed to 90° and internally rotated, and the head is removed with an extractor or levers. Soft-tissue remnants and ligamentum teres are removed from the acetabular cavity.

Femurpreparation

A sagittal or giggle's saw cuts the femur's neck, leaving about 5–10 mm of calcar over the lesser trochanter at an angle parallel to the prosthetic shoulder. To avoid fracture of the posterior femoral cortex, cautious use of bone nibblers was favored over an osteotome if neither was available.

Cemented bipolar hemiarthroplasty technique

After preparing the proximal femur for the uncemented surgery, a thorough wash with normal saline was performed, followed by the insertion of a ribbon gauge into the femoral canal to dry it. After removing the ribbon gauge, the Ryle's tube was inserted into the femoral canal, cement was pushed into the femoral canal with the help of the index finger, the Ryle's tube was removed, and the bipolar prosthesis was inserted in 5–10° of ante version into the femoral canal, pressurization was done after the prosthesis was well seated over calcar. The hip joint's stability is determined by the ability to move in different directions. A suction drain is kept in place, and the wound is closed in layers. A sterile dressing is put on the wound.

Post-operative protocol

The patients were placed in an abduction pillow for 5–7 days following surgery. The Thomas splint was used to immobilize patients with questionable reduction stability. The patient was forced to sit in bed on the 2nd post-operative day. Patients were utilizing a walker by the 3rd post-operative day. As tolerated, full-weight-bearing and ambulation were allowed. After 48 h, the suction drain was removed. After 5 days of parenteral antibiotics, the patient was shifted to oral antibiotics until the sutures were removed. On the 11th day, sutures were routinely dismissed. In every case, check radiographs were taken. By the end of the 2nd week after surgery, most of the patients had been discharged. Patients were told not to sit cross-legged or squat after discharge to avoid putting too much strain on the prosthesis, which would shorten its life span. A 6-week, 3-month, and 6-month follow-up examination was performed. During follow-up, radiographs were obtained to check for any problems. The Harris hip score system is used to evaluate the surgery's success

RESULTS AND DISCUSSION

Between November 2021 and November 2022, 20 cases of femur neck fractures were treated with bipolar hemiarthroplasty in this study. The following observations were made based on the information gathered throughout the study.

Age

The patients in the study varied in age from 50 to 80 years old, with an average age of 64.4 years.

Age in years	Number of patients	Percentage
50–60	4	20
60–70	10	50
70–80	6	30
Total	20	100

Sex

Fourteen females and six men were among the twenty20 patients in the study.

Sex	Number of patients	Percentage
Female	14	70
Male	6	30
Total	20	100

Mode of injury

Out of the 20 cases, 18 were caused by trivial trauma, and RTA caused two. There were no related injuries and no pathological fractures in this study.

Sixteen patients (80%) reported with an acute fracture, whereas 4 (20%) patients presented with a late presentation.

Side

Twelve of the 20 patients in this study had a left femur injury, and the other eight had a right femur injury.

Side of injury	Number of patients	Percentage
Left	12	60
Right	8	40
Total	20	100

Size of prosthesis

In this study, we employed prostheses ranging from 41 to 47 mm. In general, the patient's prosthesis size is determined by their build.

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

Follow-up

All of the patients in this study 20 were followed up on, and the follow-up period lasted 6 months.

Functional evaluation

Pain

In the present study, 11 patients had no pain, seven had slight discomfort, and two had mild pain at the end of 6 months.

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

Function

Gait

Limp

Out of 20 patients, 12 had no limp, seven had a slight limp, and one had a moderate limp.

LIMP	Number of patients	Percentage
None	14	70
Slight	5	25
Moderate	1	5
Severe	-	-
Total	20	100

Use of support

Support	Number of patients	Percentage
None	-	-
Single cane for long walks	15	75
Single cane for most of the time	3	15
One crutch	-	-
Two canes	2	10
Two crutches	-	-
Not able to walk at all	-	-
Total	20	100

Distance walked

Distance	Number of patients	Percentage
Unlimited	10	50
Six blocks	7	35
Three blocks	2	10
Indoor only	1	5
Bed and chair	-	-
Total	20	100

All of the patients in the study are asked about their walking distance, which is then recorded and assessed.

Fifty percent of the patients were able to walk for an infinite amount of time, whereas 35% could only walk for six blocks.

Functional activities

Activity	Number of Patients	Percentage
Stairs		
Without support	08	40
Using support	10	50
In any manner	2	10
Unable	-	-
Putting on shoes and socks		
With ease	11	55
With difficulty	9	45
Unable	-	-
Sitting		
Comfortable in any chair for 1 h	19	95
Comfortable in the high chair for 1 h	1	5
Unable to sit in any chair	-	-
Public transportation		
Able to enter	14	70
Unable to enter	6	30

Deformity

In this study, there were no fixed deformities. One patient (5%) had a 1 cm shortening. One patient (5%) had a 1 cm lengthening.

Range of motion

The Harris hip scoring system is used to determine the range of motion.

A score of 5 indicated an excellent range of motion seen in 16 patients (80%), whereas a score of 4 indicated a poor range of motion seen in four individuals (20%).

Final Harris hip score

Result	Number of Patients	Percentage
Excellent 90-100	9	45
Good 80-89	7	35
Fair 70-79	2	10
Poor <70	1	5
Total	20	100

The Harris hip score ranged from excellent to good in 85% of the patients, with 10% having a fair score and 5% having a poor result.

Intracapsular fracture of the femur neck is a relatively common fracture encountered by an orthopedic surgeon. These fractures, which are linked to senior issues, are fatal events in the lives of the older population. The long-term survivorship of bipolar hemiarthroplasty prostheses used in the elderly was high, and the procedure is considered definitive for the majority of elderly patients with a femoral neck fracture [2]. The unipolar hemiarthroplasty group had a significantly higher dislocation rate when compared with the bipolar hemiarthroplasty group. However, both provide elderly patients with equal ambulatory ability and low revision rates at medium-term follow-up [3]. Few patients need a reoperation in modular hemiarthroplasty. There was a higher reoperation rate after BHA during the 1st year than UHA. After that, no differences are seen. In patients treated with unipolar prosthesis who survive ≥ 5 years after the fracture, there are reoperations due to acetabular erosion still, crude numbers are meager, and the total reoperation rate is unaffected [4]. This meta-analysis evidenced a reduction in the acetabular erosion after bipolar hemiarthroplasty compared to the unipolar implants [5]. The goal of management should be to get the patient ambulatory as soon as possible to reduce morbidity and mortality. The outcomes of various treatment techniques, such as osteosynthesis, hemi replacement, and complete hip replacement, have been mixed.

Prosthetic replacement (total and hemi replacement) has become popular among surgeons because osteosynthesis is not a good idea for the older population. After all, a secondary procedure may be required if it fails, and old-age patients may not be able to tolerate the effects of a second surgery. Total hip arthroplasty is not favored as a primary treatment in a developing country such as ours since it is technically more difficult and expensive. As a result, the hemi replacement technique remains a popular choice, as it promotes early ambulation and functional rehabilitation. With this in mind, we designed the present study to assess the effects of hemiarthroplasty in the fractured neck of the femur using a bipolar prosthesis in the context of atypical Indian living conditions.

The Austin Moore end of the prosthesis was commonly utilized to repair these femoral neck fractures. However, problems such as anterior thigh pain and acetabular erosion are more familiar with this prosthesis. Bipolar endoprostheses, on the other hand, have significant advantages since they are specifically engineered to allow motion at the inner bearing in addition to the prosthesis-acetabulum interphase, reducing acetabular erosion, and pain. In this study, bipolar endoprostheses were used to treat 20 cases with subcapital and transcervical intracapsular fractures of the neck of the femur with displacement, posterior communication, and neck resorption that were difficult to treat with internal fixation and had an age of more than 50 years. The goal of this study is to see how well a bipolar endoprosthesis works in treating these fractures. This study's data results are assessed, analyzed, and compared to those of other studies, and the findings are appraised.

CONCLUSION

Twenty patients with intracapsular fractures of the neck of the femur with displacement, comminution, and neck resorption that were difficult to treat by internal fixation and were above 50 years old were surgically treated with hemiarthroplasty using a bipolar endoprosthesis in this study. After assessing, analyzing, and evaluating the clinical data, the following results were made. Fracture of the neck of the femur is prevalent in the older population. Bipolar H.A.s seem to have better result in HRQoL beyond the first 2 years after surgery compared to unipolar H.A.s. Bipolar H.A.s displayed a later onset of acetabular erosion compared to unipolar H.A.s. The cause for an increased incidence of femoral neck fracture in the old age group is thought to be progressive osteoporosis. When compared to age-matched controls, these patients had reduced bone mineral densities. Another factor linked to this fracture is an increased risk of falling among this population. In this age group, bipolar hemiarthroplasty can be performed safely and with good results. Bipolar hemiarthroplasty allows for early mobilization, pain alleviation, and a high degree of activity while posing little risks. When compared to Austin Moore's prosthesis, bipolar hemiarthroplasty had fewer complications, such as acetabular erosion and anterior thigh pain. As a result of these findings, we believe that bipolar hemiarthroplasty is the best treatment for intracapsular femur fracture necks.

AUTHORS' CONTRIBUTIONS

All authors have declared that they are interested in the submitted work and have contributed to journal work.

CONFLICTS OF INTEREST

All authors have no conflicts of interest.

AUTHORS FUNDING

All authors have declared that no financial support was received from any organization.

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