



ORIGINAL RESEARCH PAPER

Orthopaedics

A PROSPECTIVE STUDY OF SURGICAL MANAGEMENT OFFRACTURE NECK OF FEMUR IN ADULTS WITH CEMENTEDBIPOLARHEMIARTHROPLASTY

KEY WORDS:

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ABSTRACT

BACKGROUND: Fracture neck of the femur has been recognised since Hippocrates' day, and it was more usually observed in the older population, with fatal effects. The occurrence of femur neck fractures is divided into two age groups. Young patients who have been exposed to high intensity trauma account for just 3% to 5% of all patients. The rest occur in the older population, with about 90% of these injuries occurring as a result of a simple fall from a standing position. Factors such as the femoral head's inadequate and unprotected blood supply, intracapsular position, and significant trabecular atrophy of the femoral neck hinder fracture healing, resulting in osteonecrosis and late segmental collapse. **METHODS:** This is a prospective study that included patients who underwent Bipolar Hemireplacement Arthroplasty. Hemireplacement arthroplasty is a surgery in which the femoral head is replaced with a prosthesis while the natural acetabulum and acetabular cartilage are preserved. Though hemireplacement arthroplasty is not a perfect substitute for the natural head, it restores joint function and reasonably achieves the treatment goals, namely reducing mortality and morbidity in old age patients with effective rehabilitation, which would otherwise have resulted in disastrous recumbent complications in the old age people. **RESULTS:** In this study sample of 20 patients with intracapsular fractures of the neck of the femur with displacement, communication, and neck resorption above 50 years old were surgically treated with hemi-arthroplasty using a bipolar endoprosthesis in this study. Post operatively, bipolar hemiarthroplasty allows for early mobilisation, 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 femur fracture necks.

INTRODUCTION:

The hip-joint is a ball-and-socket articulation, formed by the articulation of the head of the femur with the cup-shaped fossa of the Acetabulum. The articular surface of the acetabulum is horse-shoe shaped and it is deficient inferiorly at the acetabular notch. The articular surfaces are covered with hyaline cartilage. The cavity of acetabulum is deepened by the presence of a fibro cartilaginous rim called the acetabular labrum. It is triangular on cross-section; the base is attached to the edge of the acetabulum, and the apex corresponds with the free margin of the labrum; the latter is in-turned so as to constrict the rim of the acetabular cavity, which closely embraces the head of the femur and assists in holding it in its place.



fractures and of ten are considered with intertrochanteric femoral fractures.



Fig4. The anatomical Classification of femoral neck fractures by location

GARDEN'S CLASSIFICATION:

The Garden classification is based on the degree of Valgus displacement.

- Type I: Incomplete/valgus impacted.
- Type II: Complete and non-displaced on AP and lateral views.
- Type III: Complete with partial displacement; Trabecular pattern of the femoral head does not lineup with that of the acetabulum.
- Type IV: Completely displaced; Trabecular pattern of the head assumes a parallel orientation with that of the acetabulum.

FEMORAL NECK FRACTURES:

Fracture of the neck of the femur, occur predominantly in the older population, typically result from low-energy falls, and may be associated with osteoporosis. Fracture of the femoral neck in the young is a very different injury and are treated in very different ways. Femoral neck fractures in young patients typically are the result of a high-energy mechanism and associated injuries are common. Most fractures of the femoral neck are intracapsular and may compromise the tenuous bloody supply to the femoral head. Basicervical femoral neck fractures are extracapsular femoral neck

THE PAUWEL'S CLASSIFICATION:

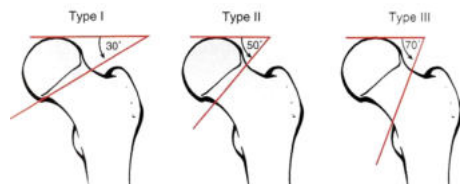


Fig6.Pauwel'sclassificationoffemoralneckfractures



BIPOLAR PROSTHESIS

This is the sort of bipolar prosthesis that we employed in our study. It has stem that measures 160mm in length and 8mm in thickness. Stainless steel 316L was used to make the stem. It features a vertical shoulder that is attached to the medial calcar. It features a 35mm neck length and a 135° neck-shaft angle. The neck measures 19mm 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. At the time of production, the acetabular component and femoral head are preassembled.

MATERIALS AND METHODOLOGY

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.

CRITERIA FOR INCLUSION:

- 1) Patients over the age of 50.
- 2) H/o trauma (road traffic accidents, slip and fall, trivial trauma).
- 3) Transcervical and sub-capital fractures with displacement & comminution.

CRITERIA FOR EXCLUSION:

- 1) Intracapsular fracture of the femur neck in those under the age of 50.
- 2) Basicervical 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 data was gathered by a thorough medical history, general physical examination, systemic examination, and local examination.

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

To determine the type of fracture, quantify the size of the head, 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 anaesthesia, and a thorough scrubbing and draping is performed. The incision is made around 10cm distal to the posterior superior iliac spine (PSIS) and continued distally and laterally parallel to the gluteus maximus fibre to the posterior edge of the greater trochanter using Moore's southern approach. The incision is made 10-13cm distally, parallel to the femoral shaft. In conjunction with the skin incision, the deep fascia is separated. The gluteus

maximus fibres are split by blunt dissection, avoiding damage to the superior gluteal arteries in the proximal region. The gluteus maximus proximal fibres are withdrawn proximally, exposing the greater trochanter, while the distal fibres are retracted distally. The sciatic nerve is carefully located and withdrawn. The capsule is exposed after the short external rotators are identified and stay 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 degrees 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.



A. Position & Incision



B. Exposure of the neck.



C. Extraction of the head

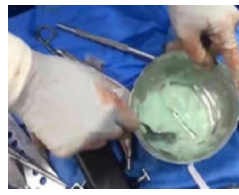


D. Head Sizing



E. Femur rasping

Figure-10: Operative Photographs



F. Mixing of bone Cement



G. Seating of the process



Meticulous soft tissue closure Figure-11: Operative Photographs



Figure-12: Instruments

FEMUR PREPARATION: A sagittal saw or giggle's saw is used to cut the femur's neck, leaving about 5-10mm 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 favoured over the use of an osteotome if neither was available.

CEMENTED BIPOLAR HEMIARTHROPLASTY TECHNIQUE

After preparing the proximal femur as for the uncemented surgery, a thorough wash with normal saline was performed, followed by insertion of a ribbon gauge into the femoral canal to dry it. After removing the ribbon gauge, the Ryles tube was inserted into the femoral canal, cement was pushed into the femoral canal with the help of the index finger, Ryles tube was removed, and the bipolar prosthesis was inserted in 5-10 degrees 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 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 to the wound.

POSTOPERATIVE PROTOCOL:

The patients were placed in an abduction pillow for 5 to 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 second postoperative day. Patients were utilizing a walker by the third post operative day. As tolerated, full weight-bearing and ambulation were allowed. After 48 hours, the suction drain was removed. After five days of parenteral antibiotics, the patient was shifted to oral antibiotics until the sutures were removed. On the 11th day, sutures were routinely removed.

In every case, check radiographs were taken. By the end of the second week after surgery, the majority 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 six-week, three-month, and six-month follow-up examination was performed. During follow-up, radiographs were obtained to check for any problems. The Harris hip score system was used to evaluate the surgery's success.

OBSERVATION AND RESULTS: 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	No. of patients	Percentage
50-60	4	20%
60-70	10	50%
70-80	6	30%
TOTAL	20	100%

Sex:

There were fourteen females and six men among the twenty patients in the study.

SEX	No. 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 two were caused by RTA. There were no related injuries and no

pathological fractures in this study. 16 patients(80%) reported with an acute fracture, where as 4(20%)patients presented with a late presentation.

SIDE:

Twelve of the twenty patients in this study had a left femur injury, here as the other eight had a right femur injury.

Side of injury	No. of patients	Percentage
LEFT	12	60%
RIGHT	8	40%
TOTAL	20	100%

SIZE OF PROSTHESIS:

We employed prostheses with sizes ranging from 41 to 47 mm in this study. In general, the patient's prosthesis size is determined by his or her build.

Size of Prosthesis	No. of Patients	Percentage
41mm	7	35%
43mm	6	30%
45mm	5	25%
47mm	2	10%
TOTAL	20	100%

FOLLOWUP:

All of the patients in this study of 20 were followed up on. The follow up period lasted six months.

FUNCTIONAL EVALUATION:

PAIN:

In the current study, 11 patients had no pain, 7 patients had slight discomfort, and 2 patients had mild pain at the end of 6 months.

PAIN	No. 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 patients has no limp, 7 patients has slight limp, 1 patient had moderate limp.

LIMP	No. of Patients	Percentage
None	14	70%
Slight	5	25%
Moderate	1	5%
Severe	-	-
Total	20	100%

USE OF SUPPORT

SUPPORT	No. 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	No. of Patients	Percentage
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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. 50% of the patients were able to walk for an infinite amount of time, whereas 35% could only walk for six blocks

FUNCTIONAL ACTIVITIES

ACTIVITY		No. of Patients	Percentage
STAIRS	Without Support	08	40%
	Using Support	10	50%
	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	14	70%
	Unable to enter	6	30%

DEFORMITY:

In this study, there were no fixed deformities.

One patient (5%) had a one centimetrshortening. One patient (5%) had a one centimetre lengthening.

RANGE OF MOTION:

The Harris Hip Scoring System is used to determine range of motion.

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

FINAL HARRIS HIP SCORE:

RESULT	No. 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 percent of the patients, with 10% having a Fair score and 5% having a Poor result.

DISCUSSION

Intracapsular fracture of the femur neck is a rather common fracture encountered by an orthopaedic surgeon. These fractures, which are linked to geriatric issues, area fatal event in the lives of the older population. 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, hemireplacement, and complete hip replacement, have been mixed.

Prosthetic replacement (total and hemi replacement) has become a popular choice among surgeons because

osteosynthesis is not a good idea for the older population because 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 favoured as a primary treatment in a developing country like 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 current study to assess effects of hemiarthroplasty in the fracture neck of the femur using a bipolar prosthesis in the context of atypical Indian's living conditions.

In the past, the Austin Moore end of prosthesis was commonly utilized to repair these femoral neck fractures. However, with the use of this prosthesis, problems such as anterior thigh pain and acetabular erosion are more common. Bipolar endo prostheses, 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 subcapitalandtranscervicalintracapsularfracturesoftheneck ofthefemurwithdisplacement, posterior communiton, 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. The results of this study's data are assessed, analysed, and compared to those of other studies, and the findings are appraised.

CONCLUSIONS

Twenty patients with intracapsular fractures of the neck of the femur with displacement, communication, 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.

The following results were made after assessing, analysing, and evaluating the clinical data:

- Fracture neck of femur is prevalent in the older population. The underlying cause of the 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 these population.
- In this age group, bipolar hemiarthroplasty can be performed safely and with good results.
- Bipolar hemiarthroplasty allows for early mobilisation, 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.

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