



A STUDY OF FUNCTIONAL OUTCOME OF CEMENTED BIPOLAR HEMIARTHROPLASTY IN UNSTABLE INTERTROCHANTERIC FRACTURES IN ELDERLY PATIENTS

Orthopaedics

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KEYWORDS

INTRODUCTION

There is a worldwide increase in the incidence of intertrochanteric fractures among elderly patients. This is due to the increased life expectancy of people and osteoporosis^{1,3}. Most of the fractures occur from trivial trauma. Intertrochanteric fracture is defined as the fracture extending from the extra-capsular basilar neck region to region along the lesser trochanter before medullary canal development. Unstable fractures are those with comminution in the posteromedial cortex. Stable trochanteric fractures can be treated with internal fixation with predictable results. The management of unstable osteoporotic fracture is still controversial. Initially, in the past, fixation of unstable fractures with fixed blade plate and enders nail had high rate of cut through and fracture displacement^{4,5}. Subsequently sliding hip screw was used with much success and become the predominant method of fixation of these fractures. However, even with this device, early full weight bearing mobilisation of unstable osteoporotic fracture can result in rotational deformity and limb length shortening, due to uncontrolled telescoping, metal fracture, screw cut out through head. Early weight bearing following internal fixation of comminuted trochanteric fractures by various means in physiologically elderly and osteoporotic patients leads to fixation failure and poor results. Hence period of restricted mobilisation is suggested for this patient⁶, which may cause complications like atelectasis, bed sores, pneumonia, deep vein thrombosis^{7,8}.

At present intramedullary interlocking devices shows better results in fixing unstable fractures. However long term outcome of these device is yet to be defined. Recently endoprosthesis replacements have shown to achieve early mobilisation of the patient and good long-term results⁹⁻¹¹. Although further prospective randomized trials are required before reaching to conclusion. Hence an ideal treatment method for unstable intertrochanteric fracture is still controversial. This study evaluates the role of primary hemiarthroplasty in treatment of unstable intertrochanteric fracture in the elderly and physiologically elderly patients.

Aim Of The Study

The aim of study is to analyse the functional outcomes of patients with comminuted intertrochanteric fracture treated by primary Hemiarthroplasty in elderly.

Objectives of the Study

1. To analyse the clinical and functional outcomes of patients with an unstable intertrochanteric fracture treated by primary cemented bipolar Hemiarthroplasty, with respect to union of fracture, and functional return.
2. To evaluate the early benefits following surgery and analyse the complications.

MATERIALS AND METHODS

Materials

20 elderly and physiologically elderly patients with comminuted intertrochanteric fractures who met the inclusion criteria were studied prospectively in the Department of Orthopaedics, BIRRD hospital, Tirupati during the period from OCTOBER 2022 to OCTOBER 2023.

Selection Criteria

Inclusion Criteria

1. Patient above 60 years of age.

2. Independently ambulatory before sustaining the fracture.

3. Comminuted intertrochanteric femur fracture (type II/III Boyd & Griffin).

Exclusion Criteria

1. Patient less than 60 years.
2. Non ambulatory patients before the surgery.
3. Patients with pathological fractures.
4. Open / stable fractures were excluded from the study.

Patient's average age was 69.4 yrs [60-85 yrs]. Both male and female patients were included in the study. 7 patients were male, 13 patients were female. Male to female ratio was 2:3. All the patients had sustained fracture following a trivial trauma. 11 patients had left sided fracture. 9 patients had right sided fracture.

Fractures were classified under Boyd and Griffin classification. 18 patients had sustained Boyd & Griffin Type II intertrochanteric fracture, 2 patients had sustained Boyd & Griffin Type III intertrochanteric fracture. The mean number of days from sustaining fracture to surgery was 15 days. All the patients were treated with cemented bipolar prosthesis through posterior (Moore's) approach

Methods

Preoperative Evaluation

After patients admission detailed history regarding mode of injury, associated co-morbid condition was taken. Clinical assessment of the patients were done in detail. All patients were treated preoperatively with bucks traction, with the aim of relieving pain preventing shortening and to reduce unnecessary movement of injured limb. Oral or parental NSAIDs were given to relieve the pain.

The following investigations were done routinely on all these patients preoperatively.

Blood investigations includes Haemoglobin %, blood grouping and Cross matching, fasting and Postprandial blood sugar, blood urea and Serum creatinine.

Radiograph

- Pelvis with both hips -AP
- Injured Hip with femur-AP (Traction and internal rotation view)
- Chest X ray PA view.

Pre-operative Templating

Pre-operative templating of radiographs of the fractured side and contra lateral side was performed to determine the approximate size and position of the stem and the approximate femoral neck offset.

The patients were operated on elective basis after overcoming the avoidable anaesthetic risks. Patients as well as the attenders were explained about the surgery and the risk factors; a written consent for the surgery was taken for all patients.

Preoperative Preparation

Injection Xylocaine 0.5cc Intradermally and injection TT 0.5cc Intramuscularly given the day prior to surgery. Intravenous antibiotic were given an hour before the surgery.

The back, lateral aspect of the hip from the iliac crest to the distal thigh, groin was prepared.

Surgical Procedure

Position Of The Patient: Straight lateral position with the patient lying on the unaffected side. Knee of the unaffected side is flexed to 45 degree which is used as intraoperative reference for measuring limb length. The skin over the hip was prepared with a scrub and application of povidone iodine and surgical spirit. The operative field was outlined by 4 sterile towels held in place by clips.

Approach: Posterior Approach

Exposure: Incision made from a point 10 cm distal to posterior superior iliac spine and extended distally and laterally to the posterior margin of the greater trochanter and then directed about 10cm parallel to the femoral shaft. Deep fascia was exposed and then gluteus maximus is split in the direction of its fibres using blunt dissection. By retracting the proximal fibres of the muscle proximally, the greater trochanter is exposed. The fractured greater trochanter is reflected anteriorly. The sciatic nerve was usually not exposed, and if it was, it was gently retracted out of the way.

Extraction of Femoral Head

After exposure of posterior part of the capsule, capsulotomy done in a „T” shaped manner. The thigh and knee are flexed to 90° and the thigh is rotated internally to expose the neck of the femur, osteotomy was done at the level of the neck. The head of the femur was levered out of the acetabulum and size measured using template.

Acetabulum Preparation

The acetabulum was prepared, the remnant ligamentum teres was completely excised and the remaining soft tissue from the pulvinar region was curetted.

Femoral Canal Preparation

The femoral shaft was rasped using a broach (rasp) and prepared for the insertion of the prosthesis.

Trial Reduction: Trial reductions were performed to determine the exact length that would provide the desired tension and tissue balancing of the abductor muscles and an equal leg length.

Cementing Technique And Reduction Of Prosthesis:

Bone cementing done by standard cementing technique. Then bipolar prosthesis introduced in the proximal femur and then reduced into the hip joint once the bone cement set in. Then the greater trochanter was put back in place. After suturing the capsule the external rotators were sutured, the wound was closed in layers over a suction drain, which is removed at the first change of dressing after 48 hours.

Post Operative Protocol

Post operatively Patients were made to sit up on the second day, stand up with support (walker) on the third day and were allowed to full weight bear and walk with the help of a walker on the fourth postoperative day, depending on his/her pain tolerance and were encouraged to walk thereafter. Sitting cross-legged and squatting were not allowed. Suture removal was done on the fifteenth postoperative day. Patients were followed up at an interval of 6 weeks, 3 months, 6 months and 12 months.

Patients were analysed clinically and radiologically at each follow up. Radiologically the patient was assessed for position of stem, stem loosening, periprosthetic fracture.

Primary Hemiarthroplasty In Unstable Trochanteric Fracture :



Preop Radiograph



Postop Radiograph

Radiograph Showing Cemented Bipolar Hemiarthroplasty

RESULTS

The following observations were made from the data collected during the study of 20 cases of intertrochanteric fractures treated by cemented bipolar hemiarthroplasty in the Department of Orthopaedics, BIRRD HOSPITAL Tirupati between October 2022 to October 2023. 20 patients were followed up at 6 weeks, 3 month, 6 months and 12 months post operatively.

The most common associated comorbid medical problem was hypertension in 9 patients followed by type II diabetes mellitus in 8 patients.

The mean time from injury to surgery was 15 days. All the cases were treated with cemented bipolar prosthesis. Tension band wiring of greater trochanter was done in 2 cases to hold the fragments together. Calcar reconstruction using cement was done in 15 cases.

Intra operatively average volume of blood loss was 354.5 ml, mean operative time was 79mins 48secs. There was no hypotension following application of bone cement into femoral canal.

Pre-operatively 5 patients (25 %) had blood transfusion and post operatively 13 patients (65%) had blood transfusion, which were uneventful.

The mean day of full weight bearing was on the 6th post operative day. Postoperatively, one patient had superficial infection which was treated with I.V. antibiotics. 9 patients had shortening of the operated limb, of which 8 had less than 2 cms, so they were given a heel raise. They walked with the help of a cane, 1 patient had shortening more than 2 cm, he had a slight limp. 5 patients (25%) had abductor weakness at 12 months of following.

The mean number of days spent by the patient in the hospital in the postoperative period was 12 days.

At the end of 12 months 4 patients walked without any support, 14 patients walked with the help of a cane, 4 patients complained of occasional anterior thigh pain on long distance walking, which was relieved on taking rest and analgesics. 2 patients were bedridden.

Functional Outcome Analysis

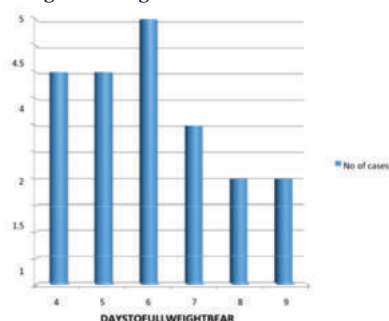
The functional results were graded according to Harris Hip Scoring System. In our study, 6 patients had excellent results, 6 patients had good results, 5 patients had fair results, 3 cases had poor result. In our study, 17 cases 85% had excellent to fair result as assessed by modified Harris hip score.

Radiological Analysis

Bipolar Stem was fitted in valgus position in 2 cases, varus position in 1 patient, whereas the position of the stem was centre (normal) in 17 patients. Cement filling was adequate in 19 cases, whereas it is inadequate in 1 case.

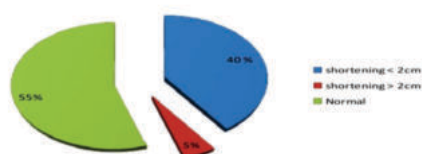
There was no prosthetic dislocation, stem loosening, acetabular erosion or periprosthetic fracture after a period of 12 months follow up in our series.

Days To Full Weight Bearing



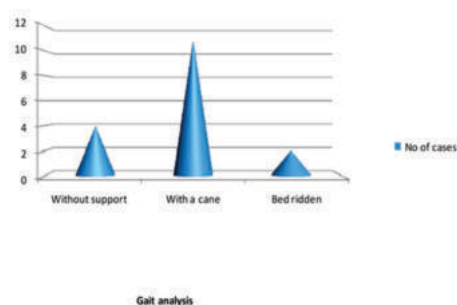
Average day to full weight bear in our study is 6 days

Limb Length Discrepancy



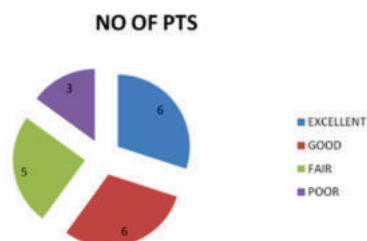
In our study 45% of patients had shortening of limb

Gait Analysis



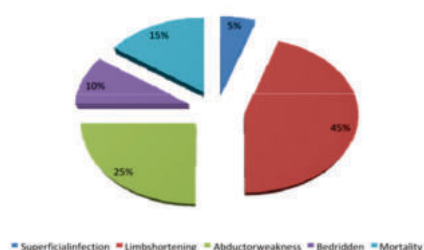
In our study 65% of patients used support (cane) for walking.

Functional Results According To Harris HIP Score:



In our study 85% of patients achieved excellent to fair result as assessed by modified Harris hip score.

Complication



The most common complication in our study is post operative shortening of limb.

DISCUSSION

Internal fixation with dynamic hip screw is the treatment of choice for stable intertrochanteric fracture. However the scenario is different when comes to the management of unstable fracture. Failure rate of as high as 56% have been noted with internal fixation of unstable fractures^{33,34}. Early weight bearing following internal fixation of comminuted trochanteric fractures by various means in physiologically elderly and osteoporotic patients leads to fixation failure and poor results⁶. Hemiarthroplasty is a frequently employed alternative as it gives stability and allows early full weight bearing. Most of the complications associated with internal fixation are avoided with the use of prosthetic replacement³⁷⁻³⁹. Initially hemiarthroplasty is used only in the treatment of failed fixation of intertrochanteric fractures.

In 1974 Tronzo⁹, was the first surgeon to use long-stem Matchett Brown endoprosthesis for the primary treatment of intertrochanteric fractures.

Following this many other surgeons also reported good results with the use of various prosthesis.

Pho. et al¹⁰, achieved good results with use of Thompson prosthesis.

In 1987, Green et al¹⁵, reported good results with bipolar prosthesis.

In this study we used bipolar prosthesis in all 20 cases.

The average age of patients in our study was 69.4 years. The mean age in studies by Hantjens et al was 80 years, by sanchetti et al²³ was 77 years, by Atul patil et al³¹ was 65.5 years, by Casey C.K et al¹⁷ was 84.2 years, and by Rodop O et al¹⁸ was 75.6 years.

Geiger et al²², reported a significant increase in blood loss (1050 ml) and operating time (115 min) compared to the internal fixation group.

Stappaerts et al⁴⁰, found no significant difference between outcomes of prosthetic group and internal fixation group except for the higher transfusion need in replacement group. Sanchetti et al²³, reported average blood loss of 350 ml and operative time of 71 minutes.

In our series average blood loss was 354.5 ml with only 13 patients required blood transfusion and the operative time was 79mins 48 seconds. Our results are comparable with other authors.

Stern and Goldstein¹⁴, used Leinbach prosthesis for treatment of 22 intertrochanteric fractures and found early ambulation and early return to preinjury status as a definite advantage. Grimsurdal¹⁹, in a study of 39 patients of unstable intertrochanteric fractures treated with cemented bipolar hip arthroplasty, reported a relatively low rate of complication.

In this study there were no complications like pressure sores, pneumonia, Deep vein thrombosis, since most of our patients were ambulatory immediately after surgery.

Siwach et al²⁷, reported shortening of < 5mm in 64% of cases, 28% of cases had limb lengthening between 5mm and 10 mm. He noticed shortening was due to excessive sinking of prosthesis following weight bearing. Kiran kumar et al³⁰, reported 20% cases had shortening of less than 2cm, 10% of case had shortening of more than 2cm

In our series there were 8 cases had shortening less than 2 cm and 1 case had shortening > 2 cm.

Sanchetti et al²³, reported 6 patients with abductor weakness, in a study of 37 trochanteric fractures treated with bipolar hemiarthroplasty. In our study 5 patients out of 20 cases had abductor weakness.

Sanchetti et al²³, reported 71 % of good to excellent results according to Harris hip score, in their series of 35 patients treated with hemiarthroplasty

Rodop et al¹⁸, in a study of 37 intertrochanteric fractures treated with bipolar hemiarthroplasty achieved 82% of good to excellent results as

assessed by Harris hip score. In our study fair to excellent results was achieved in 85% of cases. Thus the results of hemiarthroplasty in the management of intertrochanteric fractures are definitely promising.

Post-operative mortality reports were conflicting as cited in the literature, varying from 5.4 % to 48.8 % . Most of the comparative studies have shown a slight increase in mortality rate in prosthetic group than in the internal fixation group

Kesmezacare et al²⁰, reported post-op mortality rate of 48.8 % after a mean of 6 months in patients treated with endoprosthesis. Sanchetti et al²³, reported post op mortality only in 2 patients out of 37 patients (5.4%) within 6 months of surgery . They have predicted delay in treatment is the most common cause for post op mortality and morbidity.

In our series no patients died within 6 months of surgery.

CONCLUSION

In this study primary hemiarthroplasty, was performed for intertrochanteric fractures in 20 elderly patients of more than 60 years ,in our BIRRD Hospital, Tirupati.

This procedure offered excellent pain free mobile hip, with early mobilisation, easy rehabilitation and early return to functional level, when standard techniques were used.

The potential of the bipolar prosthesis in varied indications, shows its versatility. This speaks for the superiority of the procedure.

Bipolar hemiarthroplasty reduced the complications of prolonged immobilisation, prolonged rehabilitation, marked residual deformities and need for revision surgeries. The procedure offered, faster mobilization, rapid return to pre injury level, improved the quality of life and gave a long term solution in elderly patients with intertrochanteric fractures of the femur.

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