

Original Research Article

Outcome analysis of primary cemented bipolar hemiarthroplasty in elderly unstable intertrochanteric fractures during covid phase in central India

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ABSTRACT

Background: The incidence of inter-trochanteric fractures of the femur is very high in the elderly population. The world-wide incidence of all hip fractures is around 402 per 100000 and the incidence of Intertrochanteric fracture is estimated to be around 171 per 100000 in 2019. All the operative conditions were different during covid phase. We needed early ambulation of our patients for a faster recovery and avoid long stay in hospitals.

Methods: 30 patients with unstable intertrochanteric fractures were operated by bipolar hemiarthroplasty during the covid phase. All the patients were followed up at 2, 6, 10 and 16 weeks. Harris hip score and FIM score were assessed.

Results: Mean Harris hip score achieved was 87 at 16 weeks and mean FIM score achieved was 78.9 at 16 weeks indicating good functional outcomes. The outcome was excellent in 23.4%, good in 63.3%, fair in 10% and poor in 3.3% as per HHS.

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

Keywords: Bipolar hemiarthroplasty, FIM score, Harris hip score, Intertrochanteric femur fracture

INTRODUCTION

Intertrochanteric area exists between greater and lesser trochanters and made of dense trabecular bone. The stability of trochanter depends on calcar femorale. The fracture is commonly seen in elderly population with an overall incidence of hip fractures being around 402 per lac population with involvement of trochanter in 171 per lac population.^{1,2}

In the Indian population above the age of 50 years, the annual incidence of hip fractures is around 61,083 in men and 81,724 in women.³

Some of the common risk factors for Intertrochanteric fractures are femoral neck geometry, bone mass, microarchitecture and bone mineral structure of bone,

bone turnover. Some patient related factors include age, genetics, addiction, physical activity, height and weight of the patient. There are also some fall related factors like neurovascular function, cognitive impairment, visual acuity, history of drug or medicine intake, fall mechanics etc.⁴

The incidence is roughly the same as intra-capsular femoral neck fractures. The female:male ratio is between 2:1 and 8:1. In elderly it occurs commonly due to low energy falls as most patients suffer from osteoporosis whereas in younger population intertrochanteric fractures are a result of high energy trauma like road traffic accidents (RTA's).⁵

Earlier these fractures were managed conservatively by traction and external splinting which resulted in higher

morbidity and complications, so trends for operative intervention were increasing with time.⁶⁻⁸

In cases of stable inter trochanteric femur fractures, osteosynthesis can be planned with good final outcome. In cases of unstable fractures involving the trochanter, there are certain challenges like poor bone quality, possibility of loss of reduction and delayed weight bearing.^{9,10}

In the past, fixed angle devices were used for fixation of inter trochanteric fractures but complications like implant cut out and fracture displacement were observed.^{11,12} Subsequently, sliding hip screw fixation emerged as a successful and prominent method although complications such as head perforation, excessive sliding with subsequent shortening, plate pull out and plate breakage remained problematic, particularly for unstable fractures.¹³⁻¹⁶

Intramedullary interlocking devices have shown a reduced tendency for cut-out in osteoporotic bone and have demonstrated better outcomes for unstable intertrochanteric fractures.¹⁷⁻¹⁹ The procedure's shorter duration minimizes blood loss, although screw cut-out or loss of reduction may occur in osteoporotic patients.

Primary cemented bipolar hemiarthroplasty offers a management approach that allows for early mobilization, thereby avoiding most complications associated with fixation and prolonged immobilization.²⁰ Several studies have reported that primary cemented endoprosthesis yields better results than dynamic hip screw in unstable intertrochanteric fractures in elderly osteoporotic patients. However, the ideal treatment method remains a subject of debate.

The objective of our study was to assess the outcome of primary cemented bipolar hemiarthroplasty in elderly patients diagnosed with unstable inter trochanteric femur fracture during the covid pandemic period.

METHODS

This study was a prospective, randomized cohort study conducted on 30 cases diagnosed with unstable intertrochanteric femur fracture above 60 years of age, treated at our hospital, Mahatma Gandhi Memorial Medical College and Maharaja Yeshwantrao Hospital which is one of the biggest tertiary care centres in central India from June 2020 to May 2022 during the phase of COVID-19 infection spread all over the country. All the patients with neglected injury, pathological fracture or other associated injuries, psychiatric disorders, neurological disorders were excluded.

All the patients were assessed for associated injuries and primarily stabilized with fluids and analgesics. Standard AP and lateral hip radiographs were done and ankle traction applied.

Prior to study institutional review board approval was obtained and well-informed consents were taken and bipolar hemiarthroplasty was planned.

All the patients were investigated preoperatively to rule out the possibility of COVID-19 infection.

Patient taken for OT under all aseptic precautions and suitable anesthesia (spinal anesthesia or GA) and operated in lateral position with affected limb above. All the patients were operated using standard posterior approach to the hip.

Femoral head was removed and a neck cut is taken roughly about 1-2 cm above lesser trochanter (LT) depending upon the amount of comminution. In case of Greater Trochanter (GT) fractures, the gluteus medius, GT and the vastus lateralis apparatus were maintained in continuity as a stable lateral support which was fixed loosely to shaft fragment with ethibond sutures or stainless steel (SS) wires. The femoral canal was broached in appropriate anteversion.

A bipolar prosthesis was then inserted and trial reduction was done and with the trial prosthesis in situ traction was applied to the leg to compare it with the opposite leg for any limb length discrepancy (LLD).

After confirming the leg length, the implant was inserted into the femur and joint was reduced. Traction was then applied with implant in situ to achieve the desired limb length by comparing with the opposite limb on table (applied traction caused femur to be pulled distally to note the amount of distraction between the prosthesis and the femoral cut so as to mark the level on the prosthesis). This gave an idea of how much the femur implant should sink into the proximal femur so as to achieve the desired limb length at the time of final cementing of the implant.

During the final fixation of the stem, the cemented stem was allowed to sink in the femoral canal up to the mark made on the prosthesis in above stated manner and for the remaining portion a cement mantle was made so that the final limb length was equalized. Once the prosthesis was fixed, the broken trochanter and the calcar were also fixed using ethibond sutures or SS wires or tension band wiring (if required). The sleeve of gluteus medius, GT and vastus lateralis if reconstructed was now reattached to the shaft by additional wires.

The short external rotators were then re-sutured using bone tunnels in GT with the closure of the superficial layers, as routine over a suction drain after achieving hemostasis (Figure 1a-d)

Standard precautions of hip hemiarthroplasty were followed. Post-operative intravenous antibiotic was given for 3 days. Oral analgesics and antibiotics were given for 5 days. Suture removal was done at 2 weeks.

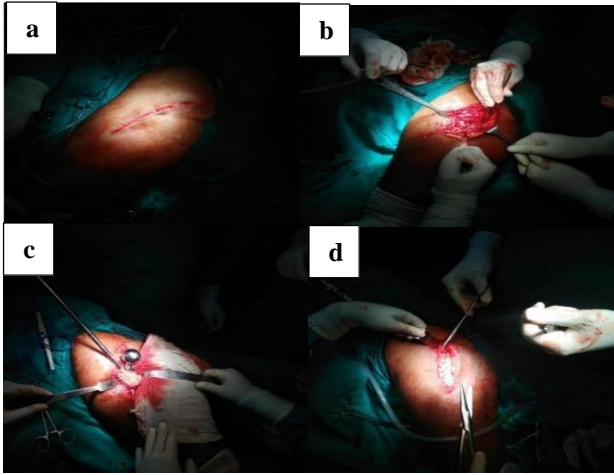


Figure 1(a-d): Intra operative images.

All patients underwent a routine postoperative physiotherapy protocol that included early gait training in form of walking with the help of a walker which was started second day post-surgery.



Figure 2: Radiological and clinical images: a) preoperative radiograph, b) immediate post operative radiograph, c) 2.5 month post operative radiograph, d) 4 month post operative radiograph, e) Patient walking with walker support, f) Patient walking independently.

Patients were followed up at 2 week, 6 weeks, 10 weeks and 16 weeks for functional outcome assessment using Harris hip score and functional independent measure score (Figure 2a-f). All the patient data was evaluated using SPSS 21.0 software.

RESULTS

In our study of 30 patients (15 males and 15 females) with unstable intertrochanteric femur fracture, the mean age found was 76 years (range- 61 years to 90 years) with right side preponderance. The mean operative time of 90

minutes with average duration of stay being 7.8 days with average blood loss being 247 ml. The most common comorbidities the patient had were hypertension and diabetes mellitus which led to delay in their surgery. Most common type of Intertrochanteric fracture encountered in our study was Evans grade IV.

Table 1: Results of the study- demographics.

Factor	Mean result (total 30 patients)
Age (60-90 years)	76 years
Sex (male:female)	1:1 ratio
Laterality (right:left side)	53:47%
Average duration of surgery	90 minutes
Average blood loss	247.34 ml
Average stay in hospital	7.8 days
Average full weight bearing (FWB) duration	6.5 days

The mean Harris hip score at 2 weeks postoperative was 62±2.09, and at 4 months it was 87±4.19. The mean FIM score at 2 weeks postoperatively was 44, which increased to 78.9 at 4 months follow up.

Table 2: Result in terms of Harris hip score (HHS).

Harris hip score (at the end of the study)	Inference	No. of patients	Percentage
90-100	Excellent	7	23.34
80-90	Good	19	63.33
70-80	Fair	03	10.00
<70	Poor	01	03.33
Total		30	100.00

Table 3: Result in terms of functional independent measure score (FIMS).

Follow up	Mean FIM score
2 Weeks	44
6 Weeks	56.5
2.5 Months	61.5
4 Months	78.9

Mean HHS was excellent for 7 patients- 23.4%, good for 19 patients- 63.3%, fair for 3 patients -10% and poor for 1 patient- 3.3%

Major complications associated with the procedure were superficial infection in 1 patient (3.3%) and joint dislocation in 1 patient (3.3%). Result is summarized in Tables 2 and 3.

DISCUSSION

Osteosynthesis has traditionally been the preferred treatment option for intertrochanteric fractures. However,

the management of unstable fractures, particularly in the geriatric population, presents a different scenario. Internal fixation of unstable fractures in elderly patients has been associated with a high failure rate. Elderly and osteoporotic patients who undergo early weight-bearing following internal fixation of comminuted trochanteric fractures often experience fixation failure and poor outcomes, necessitating further surgical intervention, including revision surgery. Initially, hemiarthroplasty was primarily used as a treatment for failed fixation of intertrochanteric fractures. However, it is now increasingly employed as an alternative to osteosynthesis as the primary treatment approach.²¹ The majority of complications associated with internal fixation result from inadequate screw purchase in osteoporotic bone and the inability of elderly patients to comply with partial weight-bearing protocols following fixation, leading to inadvertent full weight-bearing. This often results in excessive collapse at the fracture site, femoral head migration into varus and retroversion, shortening, and decreased abductor lever arm, which causes limping in patients. Another complication is screw cut-out from the femoral head. Newer implants such as the "proximal femoral nail" combine the features of a sliding hip screw (SHS) and an intramedullary nail.¹⁵ These implants can be inserted in a closed manner, reducing fracture exposure, minimizing blood loss, and causing less tissue damage compared to SHS. They also limit the amount of fracture collapse compared to an SHS. However, these implants have been associated with an increased risk of femur fracture at the nail tip or distal locking screw insertion point. The use of this implant in the management of unstable intertrochanteric fractures has shown promising results, although the long-term outcomes of these devices vary.²²

Sancheti et al, in their study reported that their patients had an average blood loss of 350 ml.²³ Out of the total patients, six patients needed blood transfusion post-surgery. There was no incidence of dislocation in their study. In our study, the average blood loss was 247.34 ml, and the average operative time was ninety minutes.

The literature presents conflicting reports regarding postoperative mortality in cases of primary hemiarthroplasty. Kesmezacare et al reported postoperative mortality rates of 34.2% after a mean of 13 months and 48.8% after a mean of 6 months in patients treated with internal fixation and endoprosthesis, respectively.²⁴ There are certain other studies which do not show any difference in postoperative mortality between the two groups.

In the study by Sancheti et al, two out of 37 patients (5.4%) died within 6 months of surgery due to unrelated causes (both secondary to myocardial infarction).²³ In our study, one patient out of 30 died due to an unrelated cause after the completion of 6 months of follow-up.

Delaying the surgery seems to be a significant predictor of morbidity and mortality in patients with proximal femur

fractures. In our study, out of 30 patients, 14 were operated on within 5 days of injury, and 16 cases were operated on between 6-10 days. Ten patients had hypertension, and nine patients had diabetes mellitus, which led to delays in preoperative fitness assessment and surgery.²⁵

During follow-up, Rodop et al conducted a study on primary bipolar hemi-prosthesis for unstable intertrochanteric fractures in 37 elderly patients and obtained good to excellent Harris hip scores in 82% of patients (17 excellent (45%) and 14 good (37%) results) after 12 months of follow-up.²⁶ Sancheti et al achieved good to excellent results in 71% of patients (25 out of 35 patients).²³ The percentage increased to 91% on including fair results as well. In a prospective study of 42 patients with a mean follow-up of 16.5 months, Thakur et al obtained excellent results in 19 patients, good results in 17, and fair results in 6 patients, with an average Harris hip score improvement from 74.4 at three months to 86.2 at the final follow-up (3 years).²⁷ In our study, the mean Harris hip score at 2 weeks postoperatively was 62, which increased to 71 at 6 weeks, 81 at 2.5 months, and 87 at 4 months. The Harris hip score was excellent for 7 patients (23.4%), good for 19 patients (63.3%), fair for 3 patients (10%), and poor for 1 patient (3.3%).

The mean functional independence measure (FIM) score at 2 weeks postoperatively was 44, which increased to 56.5 at 6 weeks, 61.5 at 2.5 months, and 78.9 at 4 months. The average duration of hospital stay in our study was 7.8 days.

Thakur et al, in their study on forty two patients observed that all patients were ambulatory at the final follow-up, with 25 patients using a cane for support while walking and 17 patients walked without any support.²⁷ Three patients in their study had an abductor lurch during the final follow-up. In our study, all patients regained mobility postoperatively, with 16 patients walking without any assistance, 12 patients using a walking stick, and 2 patients using a walker for ambulation, with an average of 6.5 days between surgery and full weight-bearing.

According to the study by Sancheti et al, one patient had a superficial infection managed with intravenous antibiotics for 2 weeks, and one patient experienced pain and a limp in the operated limb without any obvious cause.²³ One patient had a failed result due to Alzheimer's disease and did not cooperate with physiotherapy. There were no cases of dislocation, loosening, or late infection. Thakur et al encountered three complications, including one case of superficial infection, one case of urinary tract infection, and one case of a superficial bed sore.^{27,28} There were no cases of dislocation, aseptic stem loosening, subsidence of the stem or osteolysis. In our study, at 4 months of follow-up, we encountered one case of superficial infection (which responded to analgesics and antibiotics) and one case of dislocation, which was subsequently managed with girdle stone arthroplasty. We did not observe complications such as pressure sores, pneumonia, or deep

vein thrombosis, as most of our patients were made ambulatory early after surgery with active physiotherapy.

There were certain limitations to our study. This study was conducted on a small sample of patients, so it would be slightly unfair to generalize the results of this study to a larger stratum of population. The study was being done during the phase of pandemic which might have changed certain statistics which can't be predicted. The total duration of the study was less to determine the long-term outcomes after the procedure.

CONCLUSION

In this study we come to conclusion that, this procedure offered pain free mobile hip with early mobilization, easy rehabilitation and early return to functional level, when standard techniques were used. Bipolar hemiarthroplasty reduced the complications related to prolonged immobilization, need for prolong rehabilitation, residual deformities and need for revision surgeries. The procedure offered faster mobilization, rapid return to preinjury level, improve the quality of life and gave long term solution in elderly patients with unstable intertrochanteric fracture of femur. Functional outcomes in our study were at par with other implants like DHS or PFN with much less complications and early immobilization in geriatric age group patients. From above findings we conclude that, primary cemented bipolar hemiarthroplasty can be used as a preferred method of treatment of unstable intertrochanteric femur fractures in elderly age group patients.

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