

Functional outcome of unstable comminuted intertrochanteric fractures in elderly treated with primary bipolar hemiarthroplasty

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Abstract

Background: In elderly people, intertrochanteric fractures are commonly occurring fractures, and the mortality rates are ranging from 15% to 30% in elderly people. **Materials and Methods:** 60 elderly patients, with proximal femoral fractures with severe osteoporosis were admitted through OPD or casualty. This was a prospective study which was conducted in Bhaskara Medical College, from February 2019 to July 2019. These patients sustained comminuted intertrochanteric femur fracture treated with cemented bipolar hemiarthroplasty and tension band wiring for greater trochanter through transtrochanteric approach. **Results:** Hypotension was observed in 2 patients and were kept in ICU under observation. Superficial infection was observed in 4 patients, difficulty in reduction, limb shortening, wire breakage was observed in 3 patients each, aseptic loosening of implant was observed in 2 patients but did not recover back on follow up. Out of 60 patients, 20 patients showed excellent results, 30 patients showed good results, 7 patients showed fair results and 3 patients showed poor results. **Conclusion:** From this study, cemented bipolar hemiarthroplasty is the best technique for elderly osteoporotic patients with comminuted intertrochanteric femur fracture using transtrochanteric approach with no trauma to abductors or external rotators of hip and sciatic nerve as we approach the hip through the fracture site itself It also helps in faster rehabilitation, early mobilization and recovery in elderly osteoporotic patients.

Keywords: Intertrochanteric fractures, cemented bipolar hemiarthroplasty, comminuted.

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INTRODUCTION

Intertrochanteric fractures mostly are seen in elderly people who are above 65 years. The mortality rate ranges from 15% to 30%.^{1,2} Geometry, high instability, difficulty in treatment are the problems with osteoporotic bone fractures. Full weight bearing mobilization and stable

fixation are the primary treatment goals. Between the femoral neck and femoral shaft, there is a transitional bone, and intertrochanteric fractures occur there. The cortical and trabecular bones make up the transitional bone. The calcar femorale posteromedially provides the strength to distribute the stresses of weight bearing.³ The intertrochanteric fractures stability depends on posteromedial cortical buttress preservation. Treatment in such patients demand prolonged immobilization, complications such as hypostatic pneumonia, pulmonary embolism, bed sores, senile psychosis and fatality.^{4,5} The surgeon uses the most common classification which is Jensen classification, which is a modification of Evans classification, which divides the fractures into stable and unstable. The patients are divided into three groups as below; Group A: calcar and lesser trochanter intact which is no comminution bipolar prosthesis AMP type. Group B: Calcar is fractured or less bipolar which is Thompson's

type, Group C: Instability of posteromedial wall with lesser trochanter, calcar, and greater trochanter fractured. Various studies compared bipolar hemiarthroplasty with internal fixation and have also concluded that arthroplasty group had easier and faster rehabilitation.

MATERIALS AND METHODS

In elderly patients, with proximal femoral fractures with severe osteoporosis were admitted through OPD or casualty. Preoperatively, all the patients were screened clinically and radio logically for detecting the fracture anatomy, any associated diseases such as hypertension, diabetes and ischemic heart disease. Inclusion criteria were that all patients should be co-operative to physiotherapy, ambulatory pre-injury status, severe osteoporosis and patients must be elderly with age more than 65 years. Those patients who were having extracapsular fractures were included in the proximal femoral fractures group. Exclusion criteria was that all the patients should have open fractures, severely moribund patients and uncontrolled diabetes mellitus. The patients are divided into three groups as below; Group A: calcar and lesser trochanter intact which is no comminution bipolar prosthesis AMP type. Group B: Calcar is fractured or less bipolar which is Thompson’s type, Group C: Instability of posteromedial wall with lesser trochanter, calcar, and greater trochanter fractured. **Operative technique:** Incision was taken on the lateral aspect of hip, which was centered on proximal aspect of greater trochanter by laying the patient in lateral position. Incision was posteriorly curved toward posterior-superior iliac spine proximally. In the direction of skin incision, tensor fascia lata was cut. To expose fracture site, dissection was done on proximal fibers of gluteus maximus along skin incision. The fracture site was dissected carefully and retracted fracture fragments of greater trochanter and to reach base of femur neck. The femur head and attached neck through trans trochanteric window was retracted. Inspection of acetabulum was done. Remaining bone pieces were cleared off. The preparation of femoral canal using reamer

and serial broach’s was done. Then, drilling of 2 holes, 5 cm below vastus ridge on lateral aspect of proximal femur was done. From one hole in medullary canal to another hole, a stainless steel wire was passed from outside. The two free ends of the wire are lying on the lateral aspect of femur. The points to be considered during implant placement is as follows; a. Using long axis of the leg, anteversion is decided. b. Using soft tissue tension, length of implant to be inserted in femur is decided. c. On the fracture site, no spreading of excess cement as it interferes with the fracture union.

Post operatively, till 2 days, all patients were administered with analgesics by using epidural catheter. All patients were started with physiotherapy except those who had immediate complications. After operation, patients were treated with quadriceps strengthening exercises and full weight bearing walk next day with walker for first 6 weeks. After first 6 weeks, the patients were suggested to walk with stick. Patients were instructed to not use western style commode for toilet, avoid squatting, cross legged sitting for rest of life to avoid bipolar hemiarthroplasty dislocation. Regular follow up was done at 2 weeks, 4 weeks, 3 months postoperatively and then yearly once. Informed consent which was valid, willful was obtained from all the patients.

RESULTS

60 cases of cemented hemiarthroplasty for proximal femoral fractures in elderly patients with severe osteoporosis were selected in the study. This was a prospective study which was conducted in Bhaskara Medical College, Hyderabad from February 2019 to July 2019. On follow up of 1 month to 1 year, 1 patient died due to comorbid condition and 1 patient did not come for follow up. Evaluation of patients were done in detail on the basis of history, clinical and radiological examination and all the data were collected. Out of 60 cases, 60 patients were available for 1 month of follow up, 59 patients were available for 6 months of follow up and 58 patients were available for final follow up after 1 year.

Table 1: Age distribution and sex distribution,

| Age range of patients (Years) | Number of patients (%) |
|--------------------------------------|-------------------------------|
| 70-75 | 22 (36.7) |
| 76-80 | 12 (20) |
| 81-85 | 16 (26.7) |
| 86-90 | 10 (16.6) |
| Sex M/F | Number of patients (%) |
| Male | 25 (41.7) |
| Female | 35 (58.3) |

Table 1 shows that the average age was 79.6 years, youngest patient was 70 years and eldest patient was 90 years. Most of the patients were women.

Table 2: Side distribution, fracture classification and mode of injury.

| Laterality | Number of patients (%) |
|-----------------------------|-------------------------------|
| Left | 24 (40) |
| Right | 36 (60) |
| Evans classification | Number of patients (%) |
| Type 4 | 18 (30) |
| Type 5 | 42 (70) |
| Mode of injury | Number of patients (%) |
| Trivial fall | 54 (90) |
| RTA | 6 (10) |

Table 2 shows that laterality affected was right side in 60%, unstable intertrochanteric fracture of Evans type 5 was observed in 70% and the remaining 30% has Evans type 4. 90% of patients had a trivial fall which caused unstable intertrochanteric fracture of femur. Remaining 10% had road traffic accidents. Trivial fall included fall due to slip, fall on stairs and fall from bed.

Table 3: Hospitalization days, prosthesis size and surgery duration.

| Hospitalization days | Number of patients (%) |
|-----------------------------|-------------------------------|
| 6 | 6 (10) |
| 7 | 18 (30) |
| 8 | 8 (13.4) |
| 9 | 10 (16.6) |
| 10 | 11 (18.4) |
| 11 | 7 (11.6) |
| Prosthesis Size (mm) | Number of patients (%) |
| 42 | 5 (8.4) |
| 43 | 10 (16.7) |
| 45 | 25 (41.7) |
| 48 | 16 (26.6) |
| 49 | 4 (6.6) |
| Surgery duration | Number of patients (%) |
| 1 h 10 min | 4 (6.7) |
| 1 h 15 min | 7 (11.7) |
| 1h 20 min | 10 (16.7) |
| 1h 25 min | 16 (26.6) |
| 1h 30 min | 9 (15) |
| 1h 35 min | 8 (13.3) |
| 1h 40 min | 6 (10) |

Table 3 shows that 18 patients stayed for a week in hospital, 7 patients were admitted in hospital for a maximum of 11 days and 6 patients stayed for 6 days. The most commonly used prosthesis was of size of 45 mm, followed by 48 mm, 43 mm, 42 mm and 49 mm. 100 mins was the maximum time taken for surgery and the least time was 70 mins, 85 mins was the most often taken in surgery in 16 patients.

Table 4: Blood loss in surgery, Complications, Final Harris hip score.

| Blood loss (mL) in surgery | Number of patients (%) |
|--|---------------------------------------|
| Less than 200 | 45 (75) |
| 200-400 | 10 (16.7) |
| More than 400 | 5 (8.3) |
| Complications | Number of patients (%) |
| Hypotension | 2 (3.4) |
| Superficial infection | 4 (6.7) |
| Difficulty in reduction | 3 (5) |
| Limb shortening | 3 (5) |
| Wire breakage | 3 (5) |
| Aseptic loosening of implant | 2 (3.4) |
| Harris hip score after 1 year follow up | Number of patients (%), Result |
| 91-100 | 20 (33.4), Excellent |
| 81-90 | 30 (50), Good |
| 71-80 | 6 (10), Fair |
| Less than 70 | 2 (3.3), Poor |

Table 4 shows that minimum blood loss in surgery was 145 mL and maximum blood loss was 600 mL. Hypotension was observed in 2 patients and were kept in ICU under observation. Superficial infection was observed in 4 patients, difficulty in reduction, limb shortening, wire breakage was observed in 3 patients each, aseptic loosening of implant was observed in 2 patients but did not recover back on follow up. Out of 60 patients, 20 patients showed excellent results, 30 patients showed good results, 7 patients showed fair results and 3 patients showed poor results.



Figure 1

Figure 2

Figure 1: Post operative x ray of the above (same) patient with cemented bipolar hemiarthroplasty and tension band wiring for comminuted greater trochanter fracture; **Figure 2:** Pre operative x-ray of 80 years old male patients with comminuted inter trochanter fracture with osteoporosis.

DISCUSSION

In osteoporotic and elderly patients, in unstable comminuted intertrochanteric femur fractures, there were many complications such as screw cutout, plate breakage, Z-effect and reverse Z effect. To achieve good functional outcomes, maintenance of fracture reduction, proper implant positioning, monitoring weight bearing are the prerequisites. However, in osteoporotic and elderly patients, the bone quality is poor, cut out rates of implant are high and loss in reduction is more evident which leads to poor functional outcomes. Hip fractures are more serious health care problems in elderly patients as other comorbidities are evident such as bed sores, aspiration pneumonia, deep vein thrombosis and atelectasis. In our study, there were very few complications and all patients were mobilized immediately on the next day of operation. It was shown by various studies that cemented bipolar hemiarthroplasty results were very good. Mobilization was good and fast improvement in Harris hip score was observed. In study performed by Chang *et al.*; number of cases were 55 patients, excellent results were observed in 19 patients, good results were observed in 8 patients, fair and poor results were seen in 0 patients and 12 deaths were observed. In study performed by Haentjen *et al.*;⁶ number of cases were 37 patients, excellent results were observed in 7 patients, good results were observed in 11 patients, fair and poor results were seen in 7 and 5 patients and 3 deaths were observed. In study performed by Sancheti *et al.*;⁷ number of cases were 37 patients, excellent results were observed in 8 patients, good results were observed in 16 patients, fair and poor results were seen in 6 and 3 patients and 0 deaths were observed. In SA Mustafa *et al.*⁸ study, number of cases were 50 patients, excellent results were observed in 15

patients, good results were observed in 24 patients, fair and poor results were seen in 5 and 2 patients and 2 deaths were observed. In present study, the results were synchronous to the above studies, number of cases were 60, excellent results were observed in 20 patients, good results were observed in 30 patients, fair and poor results were seen in 6 and 2 patients and 1 death was observed. In the present study, there were no complications such as bed sores, aspiration pneumonia, atelectasis because all the patients were mobilized the next day after operation. In study conducted by Grimsrud C *et al.*⁹ and Faldini C *et al.*,¹⁰ internal fixation of stable and unstable intertrochanteric hip had failure rates of 6% and 32%. In studies conducted by Kim WY *et al.*,¹¹ Rodop O *et al.*,¹² Grimsrud C *et al.*;⁹ constant good results were observed for cemented bipolar hemiarthroplasty in terms of ambulation being early, good survival rates midterm in comminuted unstable intertrochanteric fractures. In the present study, similar results were observed in terms of mobilization being early, less implant related complications and faster overall rehabilitation. In Zhang *et al.*¹³ study, standard tension band wiring technique for fixation of greater trochanter was used. In the present study, delayed nonunion of greater trochanter was observed in 3 patients, treated with repeat open reduction, fixation with circlage wire and bone grafting. In Haentjens *et al.*⁶, Geiger *et al.*¹⁴ studies, dislocation rate in patient group who underwent total hip arthroplasty was higher (12-44.5%) than those who had bipolar arthroplasty (0-3.3%). In the present study, 1 patient got dislocated postoperatively, he was treated under anesthesia. In George *et al.*¹⁵ study, 10-year survivorship of cemented bipolar hemiarthroplasty in intertrochanteric fracture femur free of reoperation for any reason was

93.6%. In SA Mustafa⁸, a good early to mid-term survivorship at our mean follow-up of 2.9 years with a minimum of 1 year and a maximum of 6 years. In present study, mean follow up of 3 years with a minimum of 1 year and a maximum of 6 years. Repeat surgeries in elderly patients with other comorbidities have shown more medical complications and implant-related complications in Kim WY¹¹ *et al.* and Chapman MW¹⁶ *et al.* studies. Our series had revision surgery 5% which is less than the osteosynthesis group. In treating unstable intertrochanteric hip fractures in terms of mortality and morbidity rates, complications, rehabilitation and returning to daily activities, unipolar or bipolar hemiarthroplasty is better than open reduction and internal fixation. In present study, complications and long-term survivorship of implant would be questionable despite its advantages.

CONCLUSION

In present study, for treatment of unstable pertrochanteric femoral fractures in elderly osteoporotic patients, primary hemiarthroplasty is preferred. It is secure and effective procedure, and an early ability to bear full body weight, faster recovery rate and improved life quality is achieved. Early mobilization is the best advantage in this study.

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