

# Prospective study of functional outcome of unstable intertrochanteric fractures with hemiarthroplasty using bipolar prosthesis

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## Abstract

**Background:** Proximal femoral fractures in elderly individuals occurs in moderate or minimal trauma. Treatment methods have been used for the reduction of intertrochanteric fractures, including dynamic hip screw (DHS), proximal femoral nail (PFN), unipolar and bipolar hemiarthroplasty and external fixation. The purpose of present study was to evaluate the functional and clinical outcomes of bipolar arthroplasty as a primary treatment for unstable intertrochanteric fracture in the elderly patient. **Material and Methods:** This prospective study was conducted in patients with unstable inter-trochanteric hip fracture, operated for primary cemented bipolar hemiarthroplasty. **Results:** During study period, 36 patients satisfying inclusion criteria were considered for present study. Unstable intertrochanteric fractures were exclusively noted in patients with age more than 60 years. Mean age was  $70.2 \pm 7.3$  years. Female patients (61%) were more than males (39%). Most patients were from 60-69 years group. Most patients were from ASA status grade II (42%). Common co-morbidities in study patients were hypertension (44%), diabetes mellites (31%), cardiac (22%) and asthma/COPD (14%). Trivial trauma (44%), accidental fall and others (42%) and road traffic accidents (14%) were mode of injury noted in patients. Perioperative findings are noted in table 3. At end of 6 months mean Harris hip score was  $83.35 \pm 9.36$ . Excellent outcome was noted in 33 patients (92%). In present study, bed sore (8%) was most common complication noted, other complications were superficial infection (6%), deep infection (3%), deep venous thrombosis (3%), dislocation (3%) noted. Cut-out injury, periprosthetic fracture, non-union, malunion, varus malunion or medialisation was not noted during study period or follow up. **Conclusion:** Primary cemented bipolar hip hemiarthroplasty offer a good option in the treatment of unstable intertrochanteric fractures in older patients.

**Keywords:** hemiarthroplasty, intertrochanteric hip fracture, unstable Femoral Fractures, Proximal Femoral Fractures, Cemented Bipolar Hemiarthroplasty

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Received Date: 25/12/2019 Revised Date: 24/01/2020 Accepted Date: 11/02/2020

DOI: <https://doi.org/10.26611/1031634>

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## INTRODUCTION

Proximal femoral fractures in elderly individuals occurs in moderate or minimal trauma. Intertrochanteric fractures are associated with substantial morbidity and mortality, mechanical complications, and great financial burden to patients and their families.<sup>1,2</sup> Factors which define instability in inter-trochanteric fractures are posteromedial comminution, reverse obliquity, cases with minimal contact between proximal and distal fragments have a tendency of medial migration of the shaft, leading to failure of most implants. Treatment of unstable fractures is challenging with more complications.<sup>3</sup> Conservative management of inter-trochanteric fractures usually unites

with a mal-union and with shortening, but the problem of nonunion in trochanteric fractures has less incidence.<sup>4</sup> Many treatment methods have been used for the reduction of intertrochanteric fractures, including dynamic hip screw (DHS), proximal femoral nail (PFN), unipolar and bipolar hemiarthroplasty and external fixation. Elderly patients with unstable intertrochanteric fractures have severe comminution and displacement. These fractures are less amenable to open reduction and fixation often leading to fixation failure or nonunion.<sup>5</sup> Osteoporosis and instability are two of the most important factors leading to unsatisfactory results of treatment, and in the elderly the coexistence of unstable, comminuted fractures with osteoporosis worsens the prognosis.<sup>6</sup> Hemiarthroplasty is being considered as a primary modality of treatment in unstable intertrochanteric fractures as it allows immediate full weight bearing and stability.<sup>7</sup> However, the ideal treatment method for intertrochanteric fractures is still unclear because of the poor quality of bone mass, comorbid disorders, and difficulty in rehabilitating patients. The purpose of present study was to evaluate the functional and clinical outcomes of bipolar arthroplasty as a primary treatment for unstable intertrochanteric fracture in the elderly patient.

**MATERIAL AND METHODS**

This prospective study was conducted in unstable intertrochanteric hip fracture patients at XXX Medical College and Hospital, XXX from September 2018 to June 2020. Patients were recruited till October 2019, then minimum follow-up of 9 months completed. Study was approved by institutional ethical committee.

**Inclusion criteria**

- Patients with unstable intertrochanteric fractures , fit for surgery
- Willing to participate and follow up.

**Exclusion criteria**

- Stable fractures,
- Pathological fracture.
- Compound intertrochanteric fractures,
- Polytrauma patients, patients with associated fractures of lower limbs
- Patients who were unfit for surgery.

Informed consent was taken from patients. Detailed history, clinical examination, routine laboratory and radiological investigations were done and preanesthetic fitness was taken. Fitness was usually taken within 72 hours and patients were posted for surgery. 3D reconstruction CT scan of hip joint was obtained if required for treatment plan and surgical approach. Orthopedic surgeon with experience of more than 10 years, operated these patients, soon as the condition of the patient was stabilized, usually within 72 hours of their admission.

Patients were operated in lateral decubitus position and hip joint approached through anterior approach. Patients were operated for primary cemented bipolar hemiarthroplasty as per standard operative protocol. All patients received antibiotics and low molecular weight heparin postoperatively. Perioperative parameters such as duration of surgery, hospital stay, time to full weight bearing, and clinical complications were noted. Patient was made to sit up with legs dangling on the side and quadriceps muscle strengthening begun on day 1. All patients were started on partial weight bearing with quadrangular walker and full weight bearing within 4 days and 1 month respectively. The postoperative follow-up was scheduled as at 2, 6, 12 weeks and at 6 months. The functional outcome was assessed by Harris Hip Score (HHS) at 3 months and at the final follow-up.<sup>8</sup> Data was collected and statistical analysis was done using descriptive statistics. The qualitative variables were expressed in proportion and quantitative variables were summarized by mean and standard deviation.

**RESULTS**

During study period, 36 patients satisfying inclusion criteria were considered for present study. Unstable intertrochanteric fractures were exclusively noted in patients with age more than 60 years. Mean age was 70.2 ± 7.3 years. Female patients (61%) were more than males (39%). Most patients were from 60-69 years group.

**Table 1: Age and sex distribution.**

| Age (in years) | Male             | Female   | Total    |
|----------------|------------------|----------|----------|
| 60-69          | 6 (17%)          | 11 (31%) | 17 (47%) |
| 70-79          | 6 (17%)          | 8 (22%)  | 14 (39%) |
| ≥ 80           | 2 (6%)           | 3 (8%)   | 5 (14%)  |
| Total          | 14 (39%)         | 22 (61%) | 36       |
| Mean ± SD      | 70.2 ± 7.3 years |          |          |

Most patients were from ASA status grade II (42%). Common co-morbidities in study patients were hypertension (44%), diabetes mellites (31%), cardiac (22%) and asthma/COPD (14%). Trivial trauma (44%), accidental fall and others (42%) and road traffic accidents (14%) were mode of injury noted in patients.

**Table 2: General characteristics**

| Characteristics | No. of patients | Percentage |
|-----------------|-----------------|------------|
| ASA status      |                 |            |
| I               | 14              | 39%        |
| II              | 15              | 42%        |
| III             | 5               | 14%        |
| IV              | 2               | 6%         |
| Comorbidities   |                 |            |
| DM              | 11              | 31%        |
| Hypertension    | 16              | 44%        |
| Cardiac         | 8               | 22%        |
| Asthma/COPD     | 5               | 14%        |

| Mode of injury             |    |     |
|----------------------------|----|-----|
| Trivial trauma             | 16 | 44% |
| Accidental fall and others | 15 | 42% |
| RTA                        | 5  | 14% |

Perioperative findings are noted in table 3. At end of 6 months mean Harris hip score was  $83.35 \pm 9.36$ . Excellent outcome was noted in 33 patients (92%).

**Table 3:** Perioperative findings and Harris hip score

| Variable                      | No. of patients (%) / Mean $\pm$ SD |
|-------------------------------|-------------------------------------|
| Surgical time (mins)          | $73 \pm 19.2$                       |
| Intraoperative blood loss(ml) | $290 \pm 69.4$                      |
| Intraoperative complications  | 3 (8 %)                             |
| ICU requirement post op       | 11 (31 %)                           |
| Hospital stay (days)          | $6.9 \pm 2.5$                       |
| Harris hip score              |                                     |
| 6 weeks                       | $61.45 \pm 12.37$                   |
| 12 weeks                      | $74.10 \pm 13.85$                   |
| 6 months                      | $83.35 \pm 9.36$                    |

In present study, bedsore (8%) was most common complication noted, other complications were superficial infection (6%), deep infection (3%), deep venous thrombosis (3%), dislocation (3%) noted. Cut-out injury, periprosthetic fracture, non-union, malunion, varus malunion or medialisation was not noted during study period or follow up.

**Table 4:** Clinical and mechanical complications in the two groups

| Complication          |   |    |
|-----------------------|---|----|
| Deep Infection        | 1 | 3% |
| Superficial Infection | 2 | 6% |
| DVT                   | 1 | 3% |
| Bedsore               | 3 | 8% |
| Dislocation           | 1 | 3% |

## DISCUSSION

For several decades, the treatment of choice for unstable intertrochanteric fractures in elderly patients has been internal fixation, although several studies have shown mechanical and technical failures. Failure rate of unstable intertrochanteric fractures with osteoporosis treated with osteosynthesis has been reported to be between 4% and 16.5%.<sup>9</sup> The primary treatment for intertrochanteric fractures is internal fixation or osteosynthesis by dynamic hip screws, intramedullary implants but osteosynthesis is always a challenge in osteoporotic patients due to complications like femoral head perforation, metal failure and varus collapse. The failure after internal fixation had been due to initial fracture pattern, communication, sub-optimal fracture fixation, and poor bone quality.<sup>10,11</sup> Excessive collapse at the fracture site, loss of fixation, and migration of the lag screw result in poor functional problems associated with internal fixation of unstable intertrochanteric fracture in the elderly patients with

osteoporotic bone.<sup>12</sup> Proximal femoral nail antirotation (PFNA) has been selected by most surgeons for elderly Intertrochanteric fractures patients, failures of PFNA have also been reported due to extensive comminution, osteoporosis or long bedridden duration.<sup>13,14</sup> Mean surgical time in present study was  $73 \pm 19.2$  minutes, other Indian studies reported mean operative time ranging from 71 min to  $116 \pm 14$  min.<sup>15,16,17</sup> In present study mean hospital stay was  $6.9 \pm 2.5$  days, Sinno *et al.*<sup>18</sup> reported a similar result, while in Sancheti *et al.* study it was about 11 days.<sup>17</sup> In present study with 36 patients, at end of 6 months mean Harris hip score was  $83.35 \pm 9.36$ . Excellent outcome was noted in 33 patients (92%). Sancheti *et al.*<sup>17</sup> retrospectively analyzed 37 cases of primary hemiarthroplasty done for elderly, osteoporotic, unstable IT fractures and 91% had excellent to fair functional results. In the study by Atul Patil *et al.*<sup>19</sup> observed that Mean Harris hip score at the mean follow up of 2.92 years was 80.76 and concluded that Bipolar Hemiarthroplasty has its set of long-term complications questioning its long-term survivorship, but it is an excellent and viable option for early ambulation and good early-midterm survivorship. In study by Mohd Faizan, mean Harris hip score improved progressively with time of follow-up. The mean score was 45.30 on the third day, which increased to 58.61 at 2 weeks, whereas at 3 and 6 months the scores were 75.1 and 78.87, respectively. The final average Harris hip score at last follow-up (12 months) was 81.90.<sup>20</sup> In a study comparing hemiarthroplasty and internal fixation, better results were seen in the hemiarthroplasty group with respect to limping and use of walking aids in patients with limited walking ability before surgery.<sup>21</sup> Sinno K *et al.*<sup>18</sup> analyzed the effectiveness of primary bipolar arthroplasty in treatment of unstable intertrochanteric fractures and observed that HHS at 12 months postoperatively was significantly higher in patients who underwent bipolar arthroplasty ( $80.35 \pm 4.98$ ) compared to the internal fixation group ( $68.17 \pm 5.22$ ). Hemiarthroplasty and THA, as two possible treatment options for unstable intertrochanteric fractures, may offer the potential for quick recovery with little risk of mechanical failure, avoid the risks often associated with internal fixation, and enable patients to maintain a good level of function immediately after surgery.<sup>6</sup> The concept of bipolar hemiarthroplasty i.e. dual bearing surfaces in prosthesis, offers considerable advantages. It results in sharing of the motion at the two surfaces and hence, reduces the net wear at either surface, reduces erosion at the acetabular joint interface and total range of motions at the joint is increased. Patients who have undergone hemiarthroplasty are permitted immediate mobilization; thus, rehabilitation is quick and there are markedly fewer complications related to prolonged immobilization, such as decubitus ulcers, respiratory

infection, and atelectasis.<sup>22</sup> Hemiarthroplasty in senile comminuted intertrochanteric fracture is far more difficult compared to hemiarthroplasty in neck femur fracture which require longer learning curve and surgeons expertise to identify and reconstruct anatomical landmark correctly.<sup>23</sup> In a retrospective controlled study, authors found that although BPH and PFNA have similar functional outcome and mortality rates 12 months after operation, BPH has more postoperative complications in elderly patients with ITFs and concluded that BPH is not a good primary treatment for ITFs in elderly patients.<sup>24</sup> The major limitations of present study were short duration of follow-up, cost of the implant and the exposure to radiation. A comparative study with internal fixation group, a larger number of patients and longer duration of follow-up is recommended.

## CONCLUSION

Primary cemented bipolar hip hemiarthroplasty offer a good option in the treatment of unstable intertrochanteric fractures in older patients. Besides an early ambulation and less hospital stay, cemented hemiarthroplasty provides stable and mobile hips and decreased complications.

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Source of Support: None Declared  
Conflict of Interest: None Declared

