

## AGE-RELATED UNSTABLE INTERTROCHANTERIC FEMUR FRACTURES: THE ROLE OF PRIMARY BIPOLAR HEMIARTHROPLASTY MANAGEMENT

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### Abstract

**Background:** One of the most prevalent medical conditions affecting the elderly is intertrochanteric femur fracture. To assess the function of primary bipolar hemiarthroplasty in the management of elderly patients with unstable intertrochanteric femur fracture. **Materials and Methods:** From June 2019 to May 2020, the study was conducted prospectively in the orthopaedics department of the SRN Hospital, which is a part of the MLN Medical College in Prayagraj. **Result:** Boyd & Griffin type 2 intertrochanteric fractures account for the majority of the cases in our analysis (76.92%). Boyd and Griffin type 2 and type 3 fracture patterns were present in 20 patients (76.92%) and 6 patients (23.08), respectively. In our investigation, there were no patients with type 1 or type 4 fracture patterns. According to Singh Index, 9 patients were in grade 3, 12 patients were in grade 2, and 5 patients were in grade 1. No one among the patients is in grades 4, 5, or 6. **Conclusion:** In cases where achieving a correct reduction and stable fixation is challenging due to significant comminution and low bone quality, this treatment is excellent and warrants early mobilisation.

## INTRODUCTION

Intertrochanteric fractures comprise approximately 45%–50% of all hip fractures in older persons and 50%–60% of them are classified as unstable.<sup>[1]</sup> Unstable intertrochanteric fractures are of major cause of concern in older patients because of the associated high morbidity and mortality.<sup>[2]</sup>

Intramedullary nailing is the treatment of choice for stable hip fractures. Intramedullary nailing techniques require only a small incision and protect patients' bone structure.<sup>[3]</sup> Intramedullary nailing reduces surgical complications, blood loss, and infection. Thus, the minimally invasive procedure of intramedullary nailing is considered the most appropriate for geriatric patients.<sup>[4]</sup>

Management of unstable intertrochanteric fractures is challenging in older patients because of their poor bone quality and high risk of morbidity and mortality.<sup>[5]</sup> Osteoporosis and instability are two of the most important factors leading to unsatisfactory treatment outcomes.<sup>[6]</sup>

Selection of the implant type is extremely important because it affects these patients' survival and functional outcomes. Intramedullary nailing is also the most commonly performed procedure for unstable intertrochanteric fractures; however, a

review of published reports indicates there is a lack of consensus regarding this choice.<sup>[7]</sup>

Early postoperative resumption of full weight-bearing is difficult after intramedullary nailing because of the combination of an unstable fracture pattern, osteoporosis, and the tendency of geriatric patients to have restricted mobility for various reasons.<sup>[8]</sup> Internal fixation of unstable fractures may be accompanied by problems such as collapse, loss of fixation, and cut-out that lead to impaired function. Many surgeons have therefore recently suggested hemiarthroplasty to allow early full loading and prevent collapse in the fracture area.<sup>[8]</sup>

## MATERIALS AND METHODS

The study was conducted prospectively between June 2019 and May 2020 at the SRN Hospital's Department of Orthopaedics, which is a part of the MLN Medical College in Prayagraj. Primary bipolar hemiarthroplasty was the only viable option for all of the patients with comminuted intertrochanteric fractures of the femur who presented to the outpatient department (OPD) and trauma centre, were older than 60, and in whom achieving a stable fixation by intramedullary fixation devices and also by ORIF is challenging due to poor bone quality and

possibility of implant failure is high. The Singh Index was utilised to evaluate the patients' bone quality. study that was done prospectively.

- History by verbal communication with patients and their attendants.
- Clinical examination.
- Baseline investigation: Hb, TLC, DLC, RBS, BT, CT, Serum electrolytes, blood urea, serum creatinine, HIV I and II, HBsAg, Anti HCV, ECG.
- Basic radiological evaluation: Chest radiograph, AP and lateral view of affected site of patient.
- Diagnosis: Clinical and as well as radiological.
- Informed written consent was taken for the surgical procedure.
- Primary hemiarthroplasty was done.
- Routine antibiotics, analgesics/anti-inflammatory drugs were administered.
- Post-operative evaluation by clinical and radiological examination.
- Post-operative evaluation for range of motion at hip joint and complication if any was done.
- Follow up done at 6, 12, 24 and 48 weeks post-operatively.

All patients who presented to the department with comminuted intertrochanteric fracture femur between June 2019 to May 2020 and who satisfied the inclusion and exclusion criteria were included in this study. Total 26 patients included in this study.

#### Inclusion Criteria

1. Patient with age group >60 years of either sexes who are able to walk before injury.
2. Comminuted Intertrochanteric fracture femur (type II/III Boyd & Griffin).

#### Exclusion Criteria

1. Polytrauma patients.
2. Patient ≤60 years of age.
3. Compound intertrochanteric fractures femur.
4. Patients medically unfit for surgery.
5. Patients with immunocompromised status.

#### Treatment Of Intertrochanteric Fractures

Intertrochanteric fractures are almost always treated by early internal fixation

#### Operative treatment

Rigid internal fixation of intertrochanteric fractures with early mobilization of the patients should be considered standard treatment.

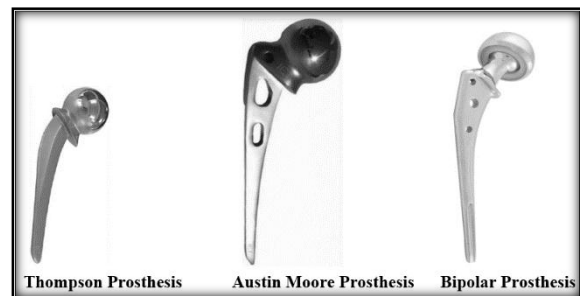
Surgical Procedures for operative management of intertrochanteric fracture femur are;

- Open Reduction and Internal Fixation Plating.
- Cephalomedullary Interlocking Nailing.
- External Fixation.
- Arthroplasty.

#### Hemiarthroplasty

Majority of intertrochanteric fractures can be treated with internal fixation.

Austin Moore, Thompson, Simple Bipolar and Modular Bipolar prosthesis are available for hemiarthroplasty which can be used on the basis of socioeconomic status of the patient.



We choose cemented bipolar hemiarthroplasty as the treatment modality for the management of unstable intertrochanteric fracture femur in elderly population. Approach5:

All the patients were treated with primary bipolar hemiarthroplasty through posterior (Moore's) approach. The posterior approach is the most common and practical of those used to expose the hip joint. Popularized by Moore, it is often called the Southern approach.



Figure 1: Position of the Patient

#### Landmarks

Palpate in detail the greater trochanter on the outer aspect of the thigh. The posterior edge of the trochanter is more superficial than the anterior and lateral portions, and as such it is easier to palpate.





**Figure 2: Incision. A) Surgical Dissection, B) Removal of the femoral head, C) Measurement of the femoral head, D) Femoral canal preparation, E) Cement restrictor insertion, F) Cement insertion, G) Stem insertion, H) Head attachment.**

The evaluation is made on the basis of radiological (hip with thigh AP view) and clinical examination (Harris hip score).

Grading for the Harris Hip Score

Successful result

= Post-operative increase in Harris Hip Score of > 20 points + radiographically stable implant + no additional femoral reconstruction.

Or

<70	Poor
70 - 79	Fair
80-89	Good
90 -100	Excellent

## RESULTS

From the information gathered during the study of 26 cases of intertrochanteric femur fractures treated with primary cemented bipolar hemiarthroplasty at the Department of Orthopaedics, SRN Hospital affiliated with MLN Medical College, Prayagraj between June 2019 and May 2020, the following conclusions were drawn.

With a mean age of 72.27 years, our study included 26 patients, 18 of whom were female and 8 of whom were male. The ratio of men to women was 1:2.25.

In our study, there were 26 patients; 8 of them were in the 61–70 age range, making up 30.77% of the total; 15 (57.69%) were in the 71–80 range; and just 3 (11.54%) were over the age of 80.

Out of 26 individuals in our study, 14 had intertrochanteric fractures on the left side whereas 12 had them on the right. This demonstrates that intertrochanteric fractures on the left side are more prevalent than on the right.

In our study, out of 26 patients, 22 had a history of trivial trauma, and 4 had undergone RTA, indicating that the most common cause of intertrochanteric fractures in the older population is trivial trauma.

The majority of the cases in our analysis (76.92%) are intertrochanteric fractures of Boyd & Griffin type 2. Boyd and Griffin type 2 and type 3 fracture patterns were present in 20 patients (76.92%) and 6 patients (23.08), respectively. In our investigation, there were no patients with type 1 or type 4 fracture patterns.

According to the Singh Index, our study included 9 patients in grade 3, 12 patients in grade 2, and 5 patients in grade 1. No one among the patients is in grades 4, 5, or 6. [Table 1]

In our study, 12 patients underwent surgery within a week, 10 patients between a week and two weeks, and 4 patients underwent surgery two weeks after the accident.

In our study, the typical procedure lasted 74.19 minutes (range 56 to 90 minutes). Surgery was completed in 3 cases in less than 60 minutes, 15 cases in between 60 and 80 minutes, and 8 cases in excess of 80 minutes. 150 ml on average of blood was lost during surgery. To provide a sufficient abductor mechanism, the greater trochanter was repaired in 16 cases using K wire, SS wire (tension band wiring and cerclage), and non-absorbable sutures.

**Table 1: Singh Index**

Singh index	No. of cases	% of cases
Grade 1	5	19.23%
Grade 2	12	46.15%
Grade 3	9	34.62%
Grade 4	0	0%
Grade 5	0	0%
Grade 6	0	0%

**Table 2: Functional outcome of the patients assessed on basis of Harris hip score**

Harris Hip Score (HHS)	At 6 weeks follow up		At 12 weeks follow up		At 24 weeks follow up		At 48 weeks follow up	
	No. of cases	Mean HHS	No. of cases	Mean HHS	No. of cases	Mean HHS	No. of cases	Mean HHS
Excellent (90-100)	1	69.81	3	75.92	5	80.85	8	85.50
Good (80-89)	5		7		10		11	
Fair (70-79)	12		11		8		6	
Poor (< 70)	8		5		3		1	

**Table 3: Complications**

Complications	No. of cases	Percentage (%)
Superficial infection	1	3.85 %
Limb length discrepancy	3	11.54 %
Hip dislocation	0	0 %
Deep vein thrombosis	0	0 %
Pressure sore	0	0 %

Pulmonary complication	0	0 %
Prosthesis loosening	0	0 %
Mortality	0	0 %

**Table 4: Comparison of our study results with other similar studies in literature**

Study by	Number of cases	Excellent	Good	Fair	Poor	Death
Dr. VijaykumarPatil et al. <sup>[6]</sup>	31	9	8	10	3	1
Parth Vinod Agrawal et al. <sup>[7]</sup>	25	6	15	3	1	0
Dr. Nikhil Gadre et al. <sup>[8]</sup>	50	1	21	26	2	0
Jayanta Mukherjee et al. <sup>[9]</sup>	20	5	7	1	2	3
Elsayed E Saoudy et al. <sup>[10]</sup>	30	4	12	10	4	0
KV Puttakemparaju et al. <sup>[11]</sup>	20	3	12	4	1	0
Ahmad S Allam et al. <sup>[12]</sup>	27	10	12	5	0	0
Rahul M Salunkhe et al. <sup>[13]</sup>	50	9	25	12	4	0
Varun Goel et al. <sup>[14]</sup>	21	9	7	3	2	0
Our study	26	8	11	6	1	0

From the first post-operative day, all patients were permitted to sit down. Weight bearing was permitted beginning on the second post-op day, and by the seventh post-op day, all patients had begun to do so. The average time for weight bearing was 3.58 days. In our study, 21 patients were released between the 11th and the 15th post-operative day, with 3 patients released earlier and 2 patients released later. After surgery, the average hospital stay was 13 days. After the stitches were removed, patients were discharged. Patients were told not to sit cross-legged or squat. Patients were followed up with at 6, 12, 24, and 48 weeks; the average follow-up time was one year. No patient was overlooked during follow-up. At each follow-up appointment, the patients' functional outcome was evaluated using their Harris hip score. At the time of the final follow-up, the mean HHS was 85.50 (the range was 67 to 97), with 8 patients having outstanding results, 11 having good results, 6 having acceptable results, and just 1 having poor results. [Table 2]

### Complications

One instance in our study had a superficial infection, and following culture and sensitivity testing, targeted antibiotic medication was used to treat it. Uneven limb length was present in three cases. Hip dislocation, deep vein thrombosis, pressure sores, pulmonary problems, and prosthesis loosening did not add to the complexity of any of the patients. [Table 3]

## DISCUSSION

Boyd & Griffin classification for trochanteric fracture was utilized in our study of 26 individuals (8 men and 18 women), to grade the fracture. Twenty patients in our study had type 2 fractures, and six had type 3 fractures. The majority of our patients (88.46%) were in the 61–80 age range, and women made up the majority of these patients (69.23%); the youngest and oldest patients were both 61 years old. Due to osteoporosis and poor bone quality, comminuted intertrochanteric fractures are more frequent in senior patients—whose average age was 72.27 years—than in younger patients. The

most frequent mode of injury was a domestic fall, which points to trivial trauma (84.62%) as a significant factor in comminuted intertrochanteric fractures. All patients had osteoporosis, as evidenced by the Singh Index, which ranged from grade 3 to 1. Average blood loss during surgery was 150 ml during the course of the 74.19-minute procedure. To obtain a sufficient abductor mechanism, greater trochanter repair was performed in 16 individuals. The average post-operative hospital stay was 13 days, and the average weight bearing time was 3.58 days.

One patient (3.8%) had a superficial infection that was treated with specific medications. A change in shoe height was used to treat limb length disparity in three patients (11.54%).

The Harris Hip Scoring System was used to provide a grade to the functional outcome. At the conclusion of our study's 48-week period, 8 patients had great results, 11 had acceptable results, 6 had fair results, and 1 instance had poor results. At the final follow-up, the mean HHS was 85.50, with a range of 67 to 97. Only 3.85% of individuals in our study had poor results, leaving 73.18% of patients with outstanding to good outcomes. 15.38% of cases involved complications. Early permission of mobilisation was the primary contributing factor to a lower complication rate and better functional success in primary bipolar hemiarthroplasty.

Elhadi AS et al.<sup>[15]</sup> conducted a study in 2018 comparing the results of primary cemented bipolar hemiarthroplasty and internal fixation in elderly patients with unstable intertrochanteric fractures. They stated that 6 of the 10 patients who acquired infections in the internal fixation group did so superficially and were treated with debridement and intravenous antibiotics. Four patients required implant removal and revision with external fixation due to deep infection. Four patients had deep venous thrombosis (DVT), four had bedsores, and eight patients experienced general problems. Seven patients had arthroplasty after experiencing cut-out and penetration into the acetabulum. One PFN patient had periprosthetic fracture, one had delayed union, one had non-union revised with hemiarthroplasty, four had varusmalunion, and two



patients received medialization as their final treatment (dynamic hip screw – DHS).

Three patients in the primary cemented bipolar hemiarthroplasty group experienced infections: two required the removal of the implants due to deep infections, one was left in place as a girdle stone, and the other underwent revision surgery after the infection had been ruled out, and one had a superficial infection. DVT affected two people. Three of the five patients with bedsores had them prior to surgery. Only one patient experienced hip dislocation, which was surgically treated. They claimed that because of the internal fixation group's prolonged period of recumbency, general and mechanical problems were more frequent. Due to early patient mobilisation, the primary hemiarthroplasty group experienced fewer sequelae such hypostatic pneumonia, thrombotic embolism, urinary problems, and pressure sores.

Since this treatment achieves vertical and horizontal offset, anteversion, and neck shaft angle in close proximity to normal anatomical position despite severe comminution and poor bone quality, bipolar hemiarthroplasty achieves centre of rotation of the hip joint in the right position. In such circumstances, it is quite challenging to achieve using different osteosynthesis techniques.

## CONCLUSION

Primary bipolar hemiarthroplasty provides a stable, pain-free, mobile joint, early mobilisation, and a superior quality of life in older patients with intertrochanteric femur fractures. Following primary bipolar hemiarthroplasty, early weight bearing can prevent consequences from lengthy prostration, such as hypostatic pneumonia, bed sores, emboli, and renal problems.

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