Journal of Research in Medical and Dental Science
2022, Volume 10, Issue 6, Page No:147-153

Available Online at: www.jrmds.in
eISSN No. 2347-2367: pISSN No. 2347-2545

Role of Primary Bipolar Hemiarthroplasty in Treatment of Unstable Intertrochanteric Femur Fracture in the Elderly Patients

Manoj Kumar Arya[1], Anoop Raj Singh[1], Nikhil Malik[1], Praganesh Kumar[2*]

[1]Department of Orthopedics, Govt Medical Saharanpur UP, India
[2]Department of Orthopedics, GSVM Medical College Kanpur UP, India

ABSTRACT

Background: Intertrochanteric femur fracture is one of the most common health problems amongst the elderly population.

Objective: To evaluates the role of primary bipolar hemiarthroplasty in treatment of unstable intertrochanteric femur fracture in the elderly patients.

Methods: The study was carried out in a prospective manner in the Department of Orthopaedics; SRN Hospital affiliated to MLN Medical College, Prayagraj; during the period from June 2019 to May 2020.

Results: Most of the cases in our study belong to Boyd & Griffin type 2 (76.92%) intertrochanteric fracture. 20 patients (76.92%) and 6 patients (23.08) had Boyd and Griffin type 2 and type 3 fracture pattern respectively. None of the patients had type 1 and type 4 fracture patterns in our study. 9 patients were grade 3, 12 patients were grade 2 and 5 patients were grade 1 as per Singh Index. None of the patients belong to grade 4, 5 and 6.

Conclusion: This procedure is excellent for those cases in which achievement of proper reduction and stable fixation is difficult due to severe comminution and poor bone quality and early mobilization is warranted.

Key words: Bipolar hemiarthroplasty, Unstable, Intertrochanteric femur fracture, Elderly patients

HOW TO CITE THIS ARTICLE: Manoj Kumar Arya, Anoop Raj Singh, Nikhil Malik, Praganesh Kumar, Role of Primary Bipolar Hemiarthroplasty in Treatment of Unstable Intertrochanteric Femur Fracture in the Elderly Patients, J Res Med Dent Sci, 2022, 10 (6):147-153.

Corresponding author: Praganesh Kumar

e-mail✉: pragnesh.doctor@gmail.com

Received: 06-June-2022, Manuscript No. JRMDS-22-66388;

Editor assigned: 07-June-2022, PreQC No. JRMDS-22-66388 (PQ);

Reviewed: 21-June-2022, QC No. JRMDS-22-66388;

Revised: 23-June-2022, Manuscript No. JRMDS-22-66388 (R);

Published: 30-June-2022

INTRODUCTION

Incidence of Intertrochanteric femur fractures has increased primarily due to increasing life span and more sedentary lifestyle brought by urbanization. Low-energy falls from a standing height account for approximately 90% of community hip fractures in patients over 50 years of age with a higher proportion of females [1]. High energy hip fractures are relatively rare, more common in males under 40 years of age. Incidence of intertrochanteric femur fractures is more in females compared to males because women tend to be less active and develop postmenopausal osteoporosis. The ratio of women to men ranges from 2:1 to 8:1 [2]. Approximately 15% to 20% of patients die within 1 year of fracture.

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 [1]. Unstable fractures are those with comminution in the posteromedial cortex.

Intertrochanteric femur fractures can be managed by conservative or operative methods. Conservative method was the treatment of choice until 1960 before the introduction of new fixation devices. As conservative methods resulted in higher mortality rates and complications like decubitus ulcer, urinary tract infections, pneumonia, thromboembolic complications these methods have been abandoned. Conservative methods are now indicated under two conditions:

- ✓ Elderly people with high medical risk for anesthesia and surgery.
- ✓ Non ambulatory patient with minimal discomfort following injury.

Intertrochanteric fractures with severe displacement and comminution are common in elderly patients. These patients have a poor bone quality and the fractures are often associated with complications such as nonunion, metal failure and femoral head perforation.

The primary treatment goal is stable internal fixation to allow early mobilization and full weight-bearing ambulation [3]. Osteosynthesis gives good results in

stable intertrochanteric fractures whereas in unstable intertrochanteric fracture it is challenging. The management of unstable intertrochanteric fractures is challenging due to poor bone quality.

The comminuted intertrochanteric fractures being in the cancellous area, fixation of all fragments is difficult. The posteromedial void is generally present which make the fracture very unstable. Recent modality of fixation of these fractures is by 4th generation of intramedullary nails like the proximal femoral nail, immobilization is required even in these implants.

Management of such cases with primary hemiarthroplasty with bipolar device permits early mobilization, thus avoiding most complications. Hemiarthroplasty offers a durable and versatile solution for comminuted intertrochanteric fractures in the elderly. It can be done as a primary procedure or secondary to failure of conservative or internal fixation, offering an advantage of rapid return of function with a pain-free, stable and mobile hip. Hemiarthroplasty for intertrochanteric fractures has been described as early as 1973. Rosenfeld first introduced it by devising prosthesis for head and neck replacement in intertrochanteric fractures, detailed the method of surgery and reported a good functional outcome.

Over the years Osteosynthesis has been indicated as the preferable mode of treatment for stable intertrochanteric fractures and has shown promising results but high rate of mortality, complications due to recumbency in initial postoperative year render this option impractical in unstable intertrochanteric fracture cases in the elderly. Primary bipolar hemiarthroplasty has emerged as a valid choice for treatment of unstable intertrochanteric fractures and has shown promising results with fewer complications. With this background, the present study was carried out with an aim to evaluate functional and biomechanical outcome in cemented bipolar hemiarthroplasty as the primary treatment choice among elderly patients with unstable Intertrochanteric femur fracture.

MATERIALS AND METHODS

The study was carried out in a prospective manner in the Department of Orthopaedics, SRN Hospital affiliated to MLN Medical College, Prayagraj; during the period from June 2019 to May 2020. All the patients presented with comminuted intertrochanteric fracture femur in the outpatient department (OPD) and in Trauma center, more than 60 years in age and in which achievement of a stable fixation is difficult by intramedullary fixation devices and also by ORIF due to poor bone quality and possibility of implant failure is high; primary bipolar hemiarthroplasty was the only good option for these cases included in this study. Singh Index was used for the assessment of the bone quality of patients. Study conducted in a prospective manner.

Method of collection of data

The steps in the data collection are:

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

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

Exclusion criteria

- ✓ Polytrauma patients.
- ✓ Patient ≤60 years of age.
- ✓ Compound intertrochanteric fractures femur.
- ✓ Patients medically unfit for surgery.
- ✓ 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 (Figure 1 to Figure 3). We choose cemented bipolar hemiarthroplasty as the treatment modality for the management of unstable intertrochanteric fracture femur in elderly population.

Table 4: Clinical presentation in 27 cases of fibroadenosis.

Presentation	No. of Patients	Percentage (%)
Breast pain	23	85.18
Sensation of lumpiness	20	74.07
Nipple discharge	1	3.7
Tenderness	22	81.48
Nodularity	20	74.07
Lump	5	18.51

Table 5: Clinical presentation of 21 cases of Fibroadenoma.

Clinical Presentation	No. of Patients	Percentage (%)
Lump in breast	21	100
Breast Pain	1	4.76
Tenderness	1	4.76

Figure 1: Thompson prosthesis.

Figure 2: Austin moore prosthesis.

Figure 3: Bipolar prosthesis.

Approach [4]

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 4).

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 5 to Figure 12).

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

The following observations were made from the data collected during the study of 26 cases of intertrochanteric fractures femur treated by primary cemented bipolar hemiarthroplasty in the Department of Orthopaedics, SRN Hospital affiliated to MLN Medical College, Prayagraj during the period from June 2019 to May 2020.

In our study, out of 26 patients 18 were female and 8 patients were male with the mean age of 72.27 years. The male to female ratio was 1:2.25.

In our study, out of 26 patients 8 patients were in 61-70 years age group which accounted for 30.77% of total

Figure 4: Position of the patient.

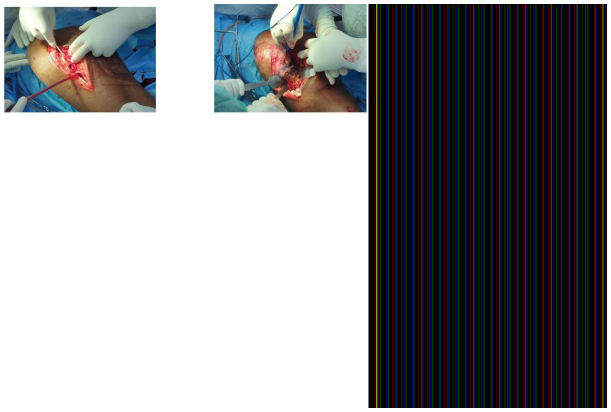

Figure 5: Incision.

Figure 6: Surgical dissection.

Figure 7: Removal of the femoral head.

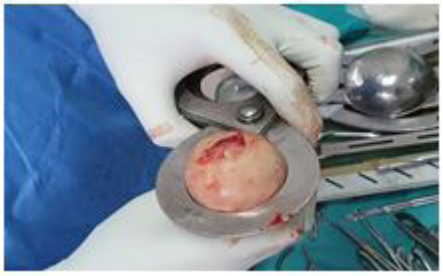

Figure 8: Measurement of the femoral head.

Figure 9: Femoral canal preparation.

Figure 10: Cement restrictor insertion.

Figure 11: Cement insertion.

patients; 15 (57.69%) patients were in 71-80 years age group and only 3 (11.54%) patients were above 80 year of age.

In our study, out of 26 patients 14 Patients had left side

intertrochanteric fracture and 12 had right side. This shows that left side intertrochanteric fractures are more common than right side.

In our study, out of 26 patients 22 had history of trivial trauma and 4 had experienced RTA, which reveals that trivial trauma is the major cause of intertrochanteric fractures in elderly population.

Most of the cases in our study belong to Boyd & Griffin type 2 (76.92 %) intertrochanteric fracture. 20 patients (76.92%) and 6 patients (23.08) had Boyd and Griffin type 2 and type 3 fracture pattern respectively. None of the patients had type 1 and type 4 fracture patterns in our study.

In our study, 9 patients were grade 3, 12 patients were grade 2 and 5 patients were grade 1 as per Singh Index. None of the patients belong to grade 4, 5 and 6 (Table 1).

In our study, 12 patients operated within the 1 week, 10 patients between 1 to 2 week and 4 patients were operated after 2 week of trauma.

In our study, average duration of surgery was 74.19 minutes (range 56 to 90 minutes). In 3 cases duration of surgery was less than 60 minutes, 15 cases were operated in 60 to 80 minutes and 8 cases were taken more than 80 minutes. Average perioperative blood loss was150 ml. In 16 cases greater trochanter reconstructed with K wire, SS wire (tension band wiring and cerclage) and non-absorbable sutures to achieve adequate abductor mechanism

Figure 12: Stem insertion.

All patients were allowed for seating from the 1st post op day. Weight bearing was allowed from 2nd post-Op day and by 7th post-Op day all patients started weight bearing with mean time of weight bearing was 3.58 days.

In our study, 21 patients discharged from 11th to 15th post-Op days, 3 patients discharged before 11th post-Op day and 2 patients discharged after 15th post-Op day. Mean hospital stay after surgery was 13 days.

Patients were discharged after removal of stitches. Patients were advised not to squat and not to sit cross legged. Patients were followed up at 6 weeks, 12 weeks, 24 weeks and 48 weeks; average duration of follow up was 1 year. None of the patients was lost in follow up.

Functional outcome of the patients was assessed on basis of Harris hip score at every follow up visit. At final follow up, mean HHS was 85.50 (range 67 to 97) and 8 patients had excellent result, 11 patients had good result, 6 patients had fair result and only 1 patient had poor result (Table 2).

Complications

In our study, one case had superficial infection which was managed by targeted antibiotic therapy after culture and sensitivity testing. Three cases had limb length

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	85.5
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%

discrepancy. None of the cases were complicated further by hip dislocation, deep vein thrombosis, pressure sore, pulmonary complications, and prosthesis loosening (Table 3).

DISCUSSION

In our study of 26 patients (8 males and 18 females), Boyd & Griffin classification for trochanteric fracture was used for grading of the fracture. In our study, 20 patients were presented with type 2 fracture and6 patients with type 3 fracture. Most of our patients (88.46%) belonged to the age group of 61-80 years and it was more common among females (69.23%); among the patients, the youngest was 61 years old and eldest was 86 years old. The average age was 72.27 years thus suggesting that comminuted Intertrochanteric fractures are more common in elderly patients, owing to osteoporosis and poor bone quality. Domestic fall was the most common mode of injury, suggesting trivial trauma (84.62%) as a major cause of comminuted Intertrochanteric fractures. All patients had definite osteoporosis as their Singh Index range from grade 3 to1. Mean duration of surgery was 74.19 minutes with an average blood loss of 150 ml during surgery. In 16 patients greater trochanter reconstruction was done to achieve adequate abductor mechanism. Mean weight bearing time was 3.58 days and average post-Op hospital stay was 13 days.

One patient (3.85%) was presented with superficial infection which managed by targeted antibiotics. Three patients (11.54%) had limb length discrepancy managed by change in shoe height.

The functional outcome was graded according to Harris Hip Scoring System.In our study at end of 48 weeks, 8 patients had excellent result, 11 patients had good result, 6 patients had fair result, and 1 case had poor result. Mean HHS was 85.50 with range from 67 to 97 at final follow up. In our study 73.08 % patients had excellent to good result only 3.85% patients had poor result. Complication rate was 15.38%. In primary bipolar hemiarthroplasty early allowance of mobilisation was the main responsible factor for less complication rate and batter functional outcome (Table 4).

Elhadi et al. [14] in 2018 studied outcome of internal fixation in comparison with primary cemented bipolar hemiarthroplasty in elderly patients with unstable intertrochanteric fracture. They reported that in internal fixation group 10 patients developed infection, of whom 6 had superficial infection, which was managed with debridement and intravenous antibiotics. 4 patients had deep infection that necessitated the removal of implants and revision with external fixation. 8 patients had general complications, 4 had deep venous thrombosis (DVT), and 4 had bedsores. Seven patients had cut-out and penetration into the acetabulum, and all were later revised with arthroplasty. One patient with PFN had periprosthetic fracture, one had non-union revised with hemiarthroplasty, one had delayed union, four had varusmalunion, and two patients ended with medialisation (dynamic hip screw – DHS). In primary cemented bipolar hemiarthroplasty group three patients had infections: two had deep infections that necessitated removal of the implants; one was left as a girdle stone and the other revised later after exclusion of the infection; one patient had superficial infection. Two patients had DVT. Five patients had bedsores, three of whom had the bedsores before surgery. Only one patient had dislocation of the hip, which was reduced surgically. They reported that general and mechanical complications were more common in the internal fixation group due to prolonged duration of recumbency. Primary hemiarthroplasty group reported less complication such as hypostatic pneumonia, thrombotic embolism, urinary complications and pressure sore due to early mobilisation of patients.

In bipolar hemiarthroplasty center of rotation of hip joint is achieved at proper position because in this procedure vertical and horizontal offset, anteversion and neck shaft angle are achieved in near normal anatomical position despite severe comminution and poor bone quality. It is very difficult to achieve with various methods of osteosynthesis in such cases.

CONCLUSION

In elderly patients with intertrochanteric fracture of the femur, primary bipolar hemiarthroplasty give stable, pain-free, and mobile joint; early mobilization and the superior quality of life. Postoperative early weight bearing after primary bipolar hemiarthroplasty avoid complication of long prostration like hypostatic pneumonia, bed sore, embolism and renal complications.

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. [5]	31	9	8	10	3	1
Parth Vinod Agrawal et al. [6]	25	6	15	3	1	0
Dr. Nikhil Gadre et al. [7]	50	1	21	26	2	0
Jayanta Mukherjee et al. [8]	20	5	7	1	2	3
Elsayed E Saoudy et al. [9]	30	4	12	10	4	0
KV Puttakemparaju et al. [10]	20	3	12	4	1	0
Ahmad S Allam et al. [11]	27	10	12	5	0	0
Rahul M Salunkhe et al. [12]	50	9	25	12	4	0
Varun Goel et al. [13]	21	9	7	3	2	0
Our study	26	8	11	6	1	0

ACKNOWLEDGEMENTS

I would like to express my profound gratitude to all the participants.

FUNDING

None.

CONFLICT OF INTEREST

None.

ETHICAL APPROVAL

Ethical clearance was obtained from the institutional ethical committee for the present study.

REFERENCES

1. https://shop.lww.com/Rockwood-and-Green-s-Fractures-in-Adults/p/9781496386519
2. http://med-mu.com/wp-content/uploads/2018/07/MBF46234234-21.pdf
3. https://orthopaedics.lwwhealthlibrary.com/book.aspx?bookid=2798
4. https://www.elsevier.com/books/mcraes-orthopaedic-trauma-and-emergency-fracture-management/white/978-0-7020-5728-1
5. Patil V, Kulkarni SS, Patel RK. Functional outcome of unstable comminuted intertrochanteric fractures in elderly treated with primary bipolar hemiarthroplasty. Int J Orthop Sci 2019; 5:59-62.
6. Agrawal PV, Wagh N, Pangavane S. To study the functional outcome of primary cemented bipolar hemiarthroplasty in the management of unstable inter-trochanteric fracture of femur among elderly. MVP J Med Sci 2017:78-83.
7. Gadre N, Kalambe HV, Das S. Cemented bipolar hemiarthroplasty in the management of comminuted intertrochanteric fracture of femur in elderly. National J Clin Orthop 2018; 2:1-5.
8. Mukherjee J, Ganguli R. Clinical outcome of primary cemented hemiarthroplasty in unstable trochanteric fractures in elderly patients. Int J Res Orthop 2018; 4:543-6.
9. Saoudy EE, Salama AM. Bipolar hemiarthroplasty for the treatment of unstable trochanteric fracture femur in the elderly. Egypt Orthop J 2016; 51:313-8.
10. Puttakemparaju KV, Beshaj NR. Unstable intertrochanteric fracture in elderly treated with bipolar hemiarthroplasty: A prospective case series. Afr J Trauma 2014; 3:81-6.
11. Allam AS. Primary cemented hemiarthroplasty for unstable intertrochanteric fractures in elderly: An intermediate follow-up. Egypt Orthop J 2014; 49:96-100.
12. Salunkhe RM, Limaye S, Biswas SK, et al. Cemented hemi-arthroplasty in proximal femoral fractures in elderly with severe osteoporosis: A case series. Med J DY Patil Univ 2012; 5:36-42.
13. Sancheti KH, Sancheti PK, Shyam AK, et al. Primary hemiarthroplasty for unstable osteoporotic intertrochanteric fractures in the elderly: A retrospective case series. Indian J Orthop 2010; 44:428-434.
14. Elhadi AS, Gashi YN. Unstable intertrochanteric fracture in elderly patients: outcome of primary cemented bipolar hemiarthroplasty versus internal fixation. SA Orthop J 2018; 17:22-26.