



CLINICAL OUTCOME OF CEMENTED HEMIARTHROPLASTY IN UNSTABLE TROCHANTERIC FRACTURES IN GERIATRIC POPULATION > 65 YEARS OF BIHAR.

Indrajeet Kumar	Assistant Professor Department of Orthopaedics, IGIMS, Patna
Janki Sharan Bhadani	Senior Resident Department of Orthopaedics, IGIMS, Patna
Nishant Kashyap	Assistant Professor Department of Orthopaedics, IGIMS, Patna
Wasim Ahmed*	Associate Professor Department of Orthopaedics, IGIMS, Patna *Corresponding Author
Santosh Kumar	Professor and head Department of Orthopaedics, IGIMS, Patna

ABSTRACT

Background: Treating unstable trochanteric fracture in the elderly patient is a real challenge because of its osteoporotic nature, bone doesn't allow adequate stability after osteosynthesis. This condition if managed with osteosynthesis may be compared with two-edged showered. As neither can we allow early weight bearing nor we want to keep our patient in prolong bed rest. Few of the studies showed implant failure after early weight-bearing with enthusiasm as weak bone with osteosynthesis was not able to bear stresses of weight bearing. On the other hand if we allow prolonged bed rest there are high risks of complications like deep vein thrombosis (DVT), pulmonary embolism, pressure sore, etc. The purpose of this prospective study is to analyze the outcome of primary hemiarthroplasty using a modular cemented bipolar prosthesis with reconstruction of greater and lesser trochanter using stainless steel wire or ethibond suture in unstable osteoporotic trochanteric fractures.

We have included 20 patients (8 male, 12 female) with mean age of 76.9 years (range 65-94 years). There was two mortality within 7 months after the operation due to an unrelated cause remaining 18 patients were followed up for minimum 12 months (range, 12-29 months). The average surgery time was 84min 33 sec (range, 70-100 min) with an average intraoperative blood loss of 329 ml (range, 280-400 ml). The patients walked on an average of 4 days after surgery. Two patients developed superficial skin infection managed conservatively. A total of 13 out of 18 patients (72.22%) had satisfactory functional results with respect to the Harris hip score.

Conclusion: Early rehabilitation and ambulation without significant limb length discrepancy (LLD) are a few of the key factors for a satisfactory outcome. This is possible with modular cemented bipolar prosthesis. Although further prospective randomized trials with more number of cases and longer follow up are needed before reaching to a conclusion.

KEYWORDS : Hemiarthroplasty, Osteoporotic Fractures, Unstable Intertrochanteric Fractures, Functional Outcome

Introduction

Comminuted trochanteric fracture is common in geriatric population.^(1,2,3) This worldwide number of is rising rapidly due to increased longevity and recent increase in road traffic accident as well. Bergström et al.⁽⁴⁾ found that low-energy trauma (fall < 1 m) caused 53% of all fractures in persons 50 years of age and older. In those over 75 years, low-energy trauma caused > 80% of all fractures. Stable fractures can be easily treated with osteosynthesis with predictable results. Management of unstable intertrochanteric (Evans type III or IV and AO/OTA type 31-A2.2.2.3) in association with osteoporosis and comorbidities in geriatric age become more challenging,^(5,6) Earlier, the treatment of these fractures was nonoperative in form of traction, which was associated with many complications like pressure sore, pneumonia, deep vein thrombosis, knee stiffness, thromboembolism etc.^(7,8) We have come a long way to manage these fracture operatively tried multiple implants in the past, of which many worth to mention. Few of the implants were now almost obsolete and few are still in common use namely sliding hip screw, or proximal femur locking compression plate, or proximal femoral nailing.^(9,10) Although functional outcome of osteosynthesis in stable type of these fractures is much better than the conservative management with markedly decrease in morbidity and mortality. Still unstable type of trochanteric fracture in poor quality of bone is a dilemma when dealing with osteosynthesis. Many a times there is intra-operative difficulty in obtaining acceptable reduction, and later results in high rates failures like implant cut-out, acetabular erosion, excessive sliding leading to shortening, varus collapse plate pullout peri-implant fracture, in osteoporotic bone. Intramedullary interlocking devices have shown reduced tendency for cut-outs than sliding hip screw in osteoporotic

bones.^(11,12) However, an ideal treatment method is still rather controversial. These issues make us to rethink about compromised stability and significant failure rate between 4-16.5%.⁽¹³⁾ We forced us to keep patient non ambulatory at cost of many complications significant morbidity and sometimes even mortality.^(14,15,16,17,18) To overcome these complications arthroplasty of hip is being done frequently.^(3,6,19,20,21,22)

The purpose of this prospective study is to analyze the outcome of primary hemiarthroplasty using a modular cemented bipolar prosthesis in unstable osteoporotic intertrochanteric femur fractures in a population of Bihar, where the population is mainly rural and health care is usually delayed due to poor economy, literacy, malnutrition and early osteoporosis.

Material and methods

After taking clearance from ethical committee and written informed consent from all our patients, prospective study done on 20 patients (8 male and 12 female) of AO/OTA type 31-A2.2 and 31-A2.3 and Evans type III or IV fractures having mean age of 76.9 years (range: 65-94 years). All those patients admitted during pre-COVID-19 era in Indira Gandhi Institute of Medical Science, Sheikhpura, Patna, Bihar from September 2017 to January 2020 (29 months) were included in the study. We have included all those patients having unstable trochanteric fracture treated by hemiarthroplasty with cemented modular bipolar prosthesis of age more than 65 years admitted in orthopaedic ward. We have excluded patients less than 65-year-old, ipsilateral lower limb fractures multiple fracture, associated head injury, compound fracture, neurological disorder, chronic debilitated and bed ridden patient, or any preoperative condition due to which patient

was non ambulatory. Patient not willing to participate in the study, and not fit for anaesthesia, were also excluded. After admission in hospital, below knee nonadhesive skin traction was applied to the leg and measured the Limb length discrepancy (LLD) using opposite leg. This measurement was used during implant insertion into the femur to equalize limb length.

X rays pelvis with both hip anteroposterior view and lateral view of injured hip with preferably full length of femur were done. Computed tomography scan or MRI were not done in any case. We had not done preoperative bone mineral density scan to confirmed osteoporosis.

For all patients general physician and physiotherapist were included in multispecialty care throughout the course in hospital and during follow up. Through counseling and written risk consent were taken as protocol in multiple co morbid patients.

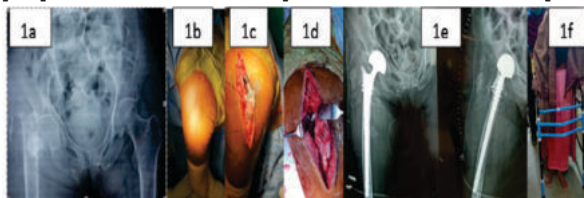
All surgeries were performed under spinal anesthesia using the lateral approach in a lateral decubitus position. Hip joint was exposed and capsulotomy of the hip joint was done. Broaching of femoral canal in appropriate anteversion was done then cemented modular bipolar prosthesis inserted after trial reduction. Cementing was done using second-generation cementing technique with a cement restrictor in all cases. To equalise the limb length stem insertion was previously marked using monopolar cautery and the stem of prosthesis was sunk up to marked point. After setting of the cement, reconstruction of the greater trochanter was performed with either stainless-steel wires or ethibond sutures. In case of communitated lesser trochanter with reconstruction of medial defect was done with cement mantle and the lesser trochanter pieces were left attached to the soft tissue. Finally, wound closure was performed in layers over negative suction drain after securing haemostasis. Postoperative, a pillow between the legs were used and static quadriceps and hamstring strengthening exercises started. Weight bearing started as early as tolerated and gait training started with the help of a walker. Suction drain was used to remove on second day. Second dressing usually performed on 5th day while stitches were removed on 12th post-operative day.

Result

In this prospective study 20 patients (8 male, 12 female) with mean age of 76.9 years (range 65-94 years) with unstable trochanteric fracture were included. The common mechanism of injury was a fall from standing height or surface level (16 cases) and a road traffic accident (4 cases). . The time interval between injury and surgery was 4 to 18 days (average: 7 days). One patient developed significant hypotension during cemented prosthesis insertion into femoral canal was managed successfully by anaesthesiologist. Pre-operatively 7 patients (35 %) and postoperatively 9 patients (45%) needed blood transfusion (PRBC). The average hospital stay was 16.5 days (12-21 day). The average surgery time was 84min 33 sec (range, 70–100 min) with an average intra-operative blood loss of 329 ml (range, 280–400 ml). Early assisted ambulation started on an average of 4 days after surgery (range, 2–8 days). Two(2) patients developed superficial skin infection were managed conservatively and four (4) patients had lurching due to abductor weakness and 5 cases that had limb length discrepancies, that is shortening of the operated limb less than 2 centimetres, with no obvious abnormality in gait.

Patients were followed up at 6 weeks, 3 month, 6 months and 12 months post operatively and assess functional outcome by Harris hip score. There was two mortality within 7 months after the operation due to cause unrelated to surgery, remaining 18 patients were followed up for 12 months. At one year results were rated as excellent (in 4/18 cases), good (9/18 cases), fair

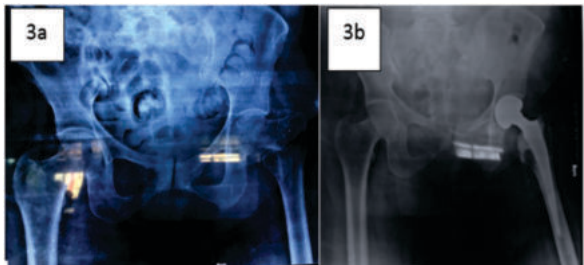
(4/18 cases), and poor (1/18 cases). So, 72.22% (13/18) had satisfactory functional result with respect to the Harris hip score (63-93) at the end of 12 months. Assisted weight bearing with the help of walker started as early as early possible depending upon pain tolerance of the patients. The average time of full weight bearing was fourth postoperative day. There was no dislocation, loosening, acetabular erosion or periprosthetic fracture after a period of 12 months followup.



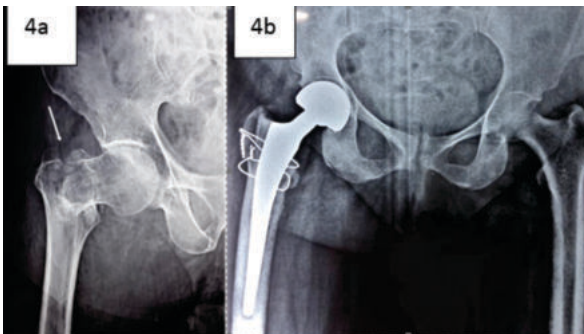
Case 1: (a) Preoperative radiograph (b),(c),(d) Intraoperative photographs (e), Postoperative Radiographs, (e) Assisted ambulation with walker.



Case 2: (a) Preoperative radiograph (b), Postoperative Radiographs.



Case 3: (a) Preoperative radiograph (b), Postoperative Radiographs



Case 4: (a) Preoperative radiograph (b), Postoperative Radiographs

Discussion

There are numerous challenges in managing unstable Intertrochanteric fractures in elderly. A number of surgical procedures are available for these fractures, either osteosynthesis by Dynamic Hip Screws (DHS), Proximal Femoral Nail (PFN) etc. or replacement surgeries. Although early weight bearing had been tried after internal fixation of unstable trochanteric fracture in elderly and osteoporotic patients but at the cost of failure rate of as high as 56%^{22,26,27}.

Hemiarthroplasty is a frequently employed alternative as it gives stability and allows early full weight bearing. Most of the

complications associated with internal fixation are avoided with the use of prosthetic replacement^{23,25}. We have tried Hemiarthroplasty in these selected cases to use benefit of stability and allowing early weight bearing.

On reviewing previous literature, we have noticed that initially hemiarthroplasty was used only in the treatment of failed fixation of intertrochanteric fractures. Tronzo et al (1974)⁽²⁸⁾, was the first surgeon to use long- stem Matchett Brown endoprosthesis for the primary treatment of intertrochanteric fractures. Later on, many orthopaedic surgeons also reported good results with the use of various prosthesis. Few noticeable works from Pho. et al⁽²⁹⁾, (used Thompson prosthesis), and Green et al (1987)⁽²¹⁾, (used bipolar prosthesis).

In this study we used cemented modular bipolar prosthesis in all 20 cases. The average age of patients in our study was 76.9 years. Which is comparable to studies done by Hantjens et al⁽²⁰⁾ (80 years), Sanchetti et al⁽³⁾ (77 Years), and by Rodop O et al⁽⁴⁰⁾ (75.6 years), and Thakur et al.⁽³¹⁾ (80.7 years).

Mean time interval between injury and operation in our study is 7 days, while in Ahmed Emory et al.⁽³²⁾ it was 2.9 days, in Thakur et al⁽³¹⁾ study it was 3 days. In our study average operative time is 84 minutes and 33 seconds and average blood loss during the procedure is 329 ml, Which is comparable to work done by Sanchetti et al⁽³⁾ (71 mins and 350 ml respectively). Although in initial period Geiger et al⁽³³⁾ reported a significant blood loss (1050 ml). Thus, we routinely maintain minimum haemoglobin level more than 9.0 gm % in preoperative as well as postoperative period. Although Carson et al suggested not to transfuse asymptomatic postoperative hip fracture patients with a haemoglobin higher than 8g/dl.⁽³⁴⁾ which was later included in AAOS guideline.

In our study We selected all those patients who were ambulatory with or without minimum difficulty before fracture, and allowed assisted weight bearing with use of walker after average of four days. Thakur et a⁽³¹⁾ in his study showed weight bearing after 2.6 days. No complications like pressure sores, pneumonia deep vein thrombosis noted, since most of our patients were ambulatory (assisted with walker) immediately after surgery. We have learnt advantages of early mobilisation from previous work showing similar good result like Stern et al⁽¹⁰⁾, (used Leinbach prosthesis in 22 cases of trochanteric fractures), Grimsurd et al⁽³⁵⁾ (cemented bipolar prosthesis in 39 cases of unstable intertrochanteric fractures).

Average duration of hospital stay in our study is 16.5 days while thakur et al⁽³¹⁾ 17.5 days. Ahmed Emory et al.⁽³²⁾ had average hospital stay period of study patients of 8.78 days.

In our study there was 5 cases had shortening less than 2 cm (27.78%). Kiran Kumar et al⁽³⁶⁾ reported 20% cases had shortening of less than 2cm, 10% of case had shortening of more than 2 cm and no case had lengthening. Siwach et al⁽³⁷⁾ reported shortening of < 5mm in 64% of cases, 28% of cases had limb lengthening between 5mm and 10 mm.

In our study 4 out of 20 patients had abductor weakness. Which is comparable to Sanchetti et al⁽³⁾ work, in which 6 out of 37 patients had abductor weakness. Sanchetti et al,⁽³⁾ reported 71 % of good to excellent results according to Harris hip score.

In our study we achieved in 72.22 % of satisfactory outcome based on Harris hip score, which is comparable to Rodop et al,⁽³⁰⁾ (82% satisfactory outcome, 37 cases)

There were two deaths in our study after 4 month of hemiarthroplasty and another one after 7 months after surgery, while Sanchetti et al⁽³⁾ who reported post op mortality

only in 2 patients (5.4%) out of 37 patients within 6 months of surgery. In our study we were not able to identify any relation of hemiarthroplasty and mortality, and it is probably due to comorbidity (78 years, uncontrolled diabetes) and natural death (90 years).

In our study there was two out of twenty cases had superficial infection subsided after negative pressure vacuum assisted dressing and intravenous antibiotics until suture removal. Sanchetti et al⁽³⁾ reported one out of thirty-five patient had a superficial wound infection which settled down with intravenous antibiotics for 2 weeks. KV Puttakemparaju et al.⁽³⁸⁾ on 20 cases had 1 case of deep surgical site infection for which implant removal was done.

Treatment of unstable intertrochanteric fracture of femur in elderly is a matter open to debate. Intertrochanteric fractures of elderly must be treated with considering the age of the patient, mental status, bone quality, and the type of fracture. It is certain that the main objective is to prevent the possible complications by early mobilization and to help the patient to return to their daily life.

Hemiarthroplasty offers easy rehabilitation, early ambulation and early return to functional level in most of the patient with painless hip.

The limitations of our study were small sample size, no comparison of bipolar Hemiarthroplasty with osteosynthesis, the short study period and so long-term complications like hip osteoarthritis, loosening, protrusion, stem failure etc. cannot be assessed.

Conflict of interest : No

Financial support : Nil

REFERENCES

- Melton JL, Ilstrup DM, Riggs BL, et al. Fifty year trend in hip fracture incidence. *Clin Orthop* 1982;162:144-49.
- Kulkarni GS, Limave R, Kulkarni S, Intertrochanteric fractures, *Indian J Orthop* 2006;40:16-23
- Sancheti K, Sancheti P, Shyam A, Patil S, Dhariwal Q, Joshi R. Primary hemiarthroplasty for unstable osteoporotic intertrochanteric fractures in the elderly: A retrospective case series. *Indian Journal of Orthopaedics*. 2010;44(4):428-434. doi:10.4103/0019-5413.67122.
- Bergström U, Björnstig U, Stenlund H, Jonsson H, Svensson O. Fracture mechanisms and fracture pattern in men and women aged 50 years and older: A study of a 12-year population-based injury register. *Osteoporos Int* 2008;19:1267-73.
- Evans EM. The treatment of trochanteric fractures of the femur. *J Bone Joint Surg Am* 1949;31:190-203.
- Marsh JL, Slongro TF, Agel J, Broderick JS, Creevey W, DeCoster TA, et al. Fracture and dislocation classification compendium: Orthopaedic Trauma Association classification, database and outcomes committee. *J Orthop Trauma* 2007;21:S1-133.
- Moran CG, Wenn RT, Sikand M, Taylor AM. Early mortality after hip fracture: is delay before surgery important? *J Bone Joint Surg Am*. 2005;87:483-9.
- Zulfikar M. Patel, Shaival S. Dalal, Kalpesh A. Mehta 3 Akash J. Shah Unstable Intertrochanteric Fractures: Hemiarthroplasty V/S Fixation *Journal of Indian Orthopaedic Rheumatology Association* July-December 2015;1(1):20-31
- Zuckerman JD. Comprehensive care of orthopaedic injuries in the elderly. Baltimore: Urban and Schwarzenberg, 1990
- Stern MB, Angerman A. Comminuted intertrochanteric fractures treated with a Leinbach prosthesis. *Clin Orthop Relat Res* 1987;218:75-80.
- Anglen JO, Weinstein JN. Nail or plate fixation of intertrochanteric hip fractures: changing pattern of practice. A review of the American Board of Orthopaedic Surgery Database. *J Bone Joint Surg Am*. 2008;90(4):700-7.
- Matre K, Havelin LI, Gjertsen JE, Vinje T, Espehaug B, Fevang JM. Sliding hip screw versus IM nail in reverse oblique trochanteric and subtrochanteric fractures. A study of 2716 patients in the Norwegian hip fracture register. *Injury*. 2013;44(6):735-42.
- Haynes RC, Poll RG, Miles AW, Weston RB. Failure of femoral head fixation: A cadaveric analysis of lag screw cut-out with the Gamma locking nail and AO dynamic hip screw. *Injury* 1997;28:337-41.
- Madsen JE, Naess L, Aune AK, Alho A, Ekelenad A, Stromsoe K. Dynamic hip screw with trochanteric stabilising plate in the treatment of unstable proximal femoral fractures: A comparative study with Gamma nail and compression hip screw. *J Orthop Trauma* 1998;12:241-8.
- Haidukewych GJ, Berry DJ (2003) Hip Arthroplasty for salvage of failed treatment of Intertrochanteric hip fractures. *J Bone Joint Surg Am* 85(5):899-904
- Baumgaertner MR, Chrostowski JH, Levy RN. Intertrochanteric hip fractures. In: Browner BD, Levine AM, Jupiter JB, Trafton PG, eds. *Skeletal trauma*, vol. 2.

Philadelphia: WB Saunders, 1992:1833-1881.

17. Bannister GC, Gibson AG, Ackroyd CE, Newman JH. The fixation and prognosis of trochanteric fractures: A randomized prospective controlled trial. *Clin Orthop Relat Res* 1990;254:242-6.
18. Chinoy MA, Parker MJ. Fixed nail plates versus sliding hip systems for the treatment of trochanteric femoral fractures: A meta analysis of 14 studies. *Injury* 1999;30:157-63.
19. Moller BN, Lucht U, Grymer F, Bartholdy NJ. Instability of trochanteric hip fractures following internal fixation: A radiographic comparison of the Richards sliding screw-plate and the McLaughlin nail-plate. *Acta Orthop Scand* 1984;55:517-20.
20. Haentjens P, Casteleyn PP, De Boeck H, et al. Treatment of unstable intertrochanteric and subtrochanteric fractures in elderly patients: primary bipolar arthroplasty compared with internal fixation. *J Bone Joint Surg* 1989;71A:1214-1255
21. Green S, Moore T, Prano F: Bipolar prosthetic replacement for the management of unstable Inter trochanteric hip fractures in the elderly, *Clin Orthop* 1987, Nov:224:169-177.
22. Wolfgang GL, Bryant HH, O'Neill JP Treatment of intertrochanteric fractures of the femur using sliding screw plate fixation. *Clin Orthop* 1982;163:148-158.
23. Dimon JH III, Hughston JC (1967) Major components of unstable trochanteric fractures. *J Bone Joint Surg* 49A:440-444.
24. Sarmiento A (1975) Valgus osteotomy technique for unstable trochanteric fractures. In: Proceedings of third open scientific meeting of hip society. CV Mosby, St. Louis, 157-169.
25. Ecker MLM, Joyce JJ, Kohe JE (1975) The treatment of trochanteric hip fractures, a compression screw fixation. *J Bone Joint Surg* 87A:23-27
26. Kyle RF, Cabanela ME, Russell TA, Swionkowski MF, Winquist RA, Zuckerman JD, et al. Fractures of the proximal part of the femur. *Instr Course Lect.* 1995; 44:227-253.
27. Haidukewych GJ, Israel TA, Berry DJ. Reverse obliquity fractures of the intertrochanteric region of the femur. *J Bone Joint Surg Am.* 2001; 83:643-650.
28. Tronzo RG. The use of an endoprosthesis for severely comminuted intertrochanteric fractures. *Orthop Clin North Am* 1974;5:679-681.
29. Pho RW, Nather A, Tong GO, Korku CT. Endoprosthetic replacement of unstable, comminuted intertrochanteric fracture of the femur in the elderly. *J Trauma* 1981;21:792-797
30. Rodop O, Kiral, Kaplan H, Akmaz I: Primary bipolar hemiprosthesis for unstable intertrochanteric fractures. *Int Orthop* 2002; 26(4): 233-237.
31. Thakur A, Lal M (2016) Cemented Hemi arthroplasty in elderly osteoporotic unstable Trochanteric fractures using fracture window. *Malaysian Orthopaedic Journal* 10(1): 5-10.
32. Elmorsy A, Saied M, Allah AA, Zaied M, Hafez M (2012) Primary Bipolar Arthroplasty in Unstable Intertrochanteric Fractures in Elderly. *Open Journal of Orthopedics* 2: 13-17.
33. Florian Geiger, Monique Zimmermann-Stenzel Christian Heisel, Burkhard Lehner, Wolfgang Daecke: Trochanteric fractures in the elderly: the influence of primary hip arthroplasty on 1-year mortality. *Arch Orthop Trauma Surg.* 2007 December; 127(10):959-966.
34. Carson JL, Terrin ML, Noveck H et al. Liberal or restrictive transfusion in high-risk patients after hip surgery. *N Engl J Med* 2011; 365(26):2453-2462.
35. Chris Grimsrud, Raul J. Monzon, Jonathan Richman and Michael D. Ries: Cemented Hip Arthroplasty With a Novel Cerclage Cable Technique for Unstable Intertrochanteric Hip Fractures. *J Arthroplasty* 2005 Apr; 337-343.
36. Kiran Kumar GN, Sanjay meena, Vijaya Kumar, Manjunath S, Vinaya raj MK.: Bipolar Hemi arthroplasty in Unstable Intertrochanteric Fractures in Elderly: A Prospective Study. *Journal of Clinical and Diagnostic Research* 2013; 7(8): 1669-71. 102
37. Ramchander Siwach, Hemant Jain, Roop Singh, Kapil Sangwan.: Role of hemiarthroplasty in intertrochanteric fractures in elderly osteoporotic patients: a case series. *Eur J Orthop Surg Traumatol* (2012) 22:467-472.
38. Puttakemparaju K V, Bes haj N R (2014) Unstable Intertrochanteric fracture in elderly treated with bipolar Hemi arthroplasty: A prospective case series. *Afr J Trauma* 3(2): 81-86.