

Management of Extracapsular Fracture Hip in Elderly by Bipolar Prosthesis

Amarnath Chaturvedi¹, Ramashish Yadav², Rahul Ranjan³

¹PG Student, Department of Orthopaedics, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India

²Assistant Professor, Department of Orthopaedics, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India

³Assistant Professor, Department of Orthopaedics, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India

Received: 10-03-2023 / Revised: 05-04-2023 / Accepted: 20-04-2023

Corresponding author: Dr. Amarnath Chaturvedi

Conflict of interest: Nil

Abstract

Aim: This study evaluated the role of primary cemented hemiarthroplasty in the treatment of unstable trochanteric fractures in elderly and physiologically elderly patients.

Methods: A study was conducted in the Department of Orthopaedics Darbhanga Medical College and Hospital, Darbhanga, Bihar, India. 20 elderly patients who were above 60 years of age with unstable osteoporotic intertrochanteric fractures, who underwent cemented bipolar hemiarthroplasty were studied prospectively from September 2020 to November 2022. Patients who were less than 60 years of age, non-ambulatory before injury and patients with stable intertrochanteric fractures, pathological fractures cognitive impairment were excluded from the study. Fractures were classified based on Boyd and Griffin classification. All the patients were treated with cemented bipolar prosthesis through direct lateral approach by coxofemoral bypass with standard non modular fixed bipolar prosthesis. Mean follow up period was 12 months. Patients were assessed using modified Harris hip score.

Results: In our study, mean age of the patient was 69.4 yrs, 18 cases were of type 2 fractures, 2 cases were type 3 fracture. 8 patients had limb shortening of less than 2 cm, whereas 1 patient had limb shortening of 3 cm. 5 patients had abductor weakness. As assessed by modified Harris hip score, excellent to fair results were obtained at 12 months follow up in 15 cases (75 %), 2 cases (10%) had poor results. 3 patients died postoperatively due to unrelated causes. One patient had superficial infection and was treated with I.V. antibiotics. In our series, we had no complications like stem loosening, periprosthetic fractures, and prosthetic dislocations.

Conclusion: Primary cemented hemiarthroplasty for unstable osteoporotic elderly trochanteric fractures appears to be a good alternative treatment modality. Early full weight bearing and rehabilitation is a definitive advantage of this method.

Keywords: Intertrochanteric Fracture, Primary Bipolar Hemiarthroplasty, Elderly Patients.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Femoral neck fractures in the elderly population are one of the common causes of orthopedic admission. [1] It includes

either intracapsular or extracapsular fractures, majority being intracapsular. The treatment of choice in displaced

intracapsular femoral neck fractures is hip arthroplasty— total or hemi replacement. [2] Total hip arthroplasties are frequently used in young patients requiring higher functional demands as per the NICE recommendation. [3] Total hip arthroplasties have better functional outcome compared to hemiarthroplasty at the expense of increased intraoperative blood loss, increased cost, longer surgical duration, and higher rates of dislocation. [4] Total hip arthroplasty is mainly recommended for younger and active individuals with fractures which are difficult to fix (Garden type 3/4). [5,6] Majority of elderly patients (60%) have severe systemic diseases (The American Society of Anesthesiologists Grade 3) and are of an average age of over 80 years. [7] Their associated comorbidities make them difficult candidates for optimization prior to surgery.

Osteoporosis and instability are the most important factors leading to failure of osteosynthesis [8,9] and also in these elderly patients early mobilization [10] and weight bearing is imperative to reduce complications like pneumonia and deep vein thrombosis. The fracture stability, quality of bone and early mobilization of the patient are the factors which determine the functional outcome of intertrochanteric fractures in elderly people. To allow early postoperative weight bearing and to decrease complications of osteosynthesis surgeons have recommended VDP Prosthesis [11], primary Bateman Leinbach prosthesis [12] or bipolar prosthetic replacement [13,14] for the treatment of comminuted intertrochanteric fractures in elderly people.

The American Academy of Orthopedic Surgeons (AAOS) recommends the use of both DHS and IN for stable EC fractures, while only IN for the unstable ones. [15] However, in this latter, both types of fixation devices were associated to a high risk of failure with the need of a subsequent hip replacement. [16] Total hip

arthroplasty (THA) after a failed osteosynthesis was associated to worse outcomes, [17] and therefore a proper patient selection should be desirable, considering that this frailty population very often could not afford a secondary procedure. Therefore, the use of THA as a primary treatment for EC fractures had been proposed by several authors with viable outcomes. [18,19] However, THA in EC fractures are not complication free, and a high risk of both mechanical (i.e. dislocation) and local complications (i.e. wound infection) had been reported. [20]

This study evaluated the role of primary cemented hemiarthroplasty in the treatment of unstable trochanteric fractures in elderly and physiologically elderly patients.

Materials and Methods

A study was conducted in the Department of Orthopaedics Darbhanga Medical College and Hospital, Darbhanga, Bihar, India. 20 elderly patients who were above 60 years of age with unstable osteoporotic intertrochanteric fractures, who underwent cemented bipolar hemiarthroplasty were studied prospectively from September 2020 to November 2022. Patients who were less than 60 years of age, non-ambulatory before injury and patients with stable intertrochanteric fractures, pathological fractures cognitive impairment were excluded from the study. Fractures were classified based on Boyd and Griffin classification. All the patients were treated with cemented bipolar prosthesis through direct lateral approach by coxofemoral bypass with standard non modular fixed bipolar prosthesis. Mean follow up period was 12 months. Patients were assessed using modified Harris hip score.

Inclusion Criteria

1. Unstable intertrochanteric fractures.
2. Age 60 years and above.
3. Patients who were mobile previous to injury.

4. No other fractures sustained.

Exclusion Criteria

1. Stable intertrochanteric fractures.
2. Patients who were unfit for surgery.
3. Patients who were bed ridden prior to injury.

Before the start of the study, institutional ethics committee permission was obtained for conducting the study. Written informed consent was obtained from the patients for participating in the study after explaining the purpose of the study.

Preoperative treatment: On admission to the hospital, x-rays were taken and immediate immobilization of fractured limb with skin/skeletal traction with about 3 or 5 Kg weight respectively was applied to maintain the reduction, to reduce the pain, give comfort and to prevent further soft tissue damage. Classification was done with AO classification system. All routine investigations were done which were prerequisite for pre-anaesthetic check-ups. As operative treatment was considered, the following factors, which determine the strength of fracture-implant assembly, namely the (i) Bone quality, (ii) Fracture geometry (iii) Fracture reduction, (iv) implant design and (v) Implant placement were stressed upon during preoperative planning. The anaesthesia employed was left to the anesthesiologist's choice. Local parts were shaved in the ward preoperatively two hours before the surgery. Every patient was given prophylactic antibiotic (1 gm parental ceftriaxone) just before surgery. The injured hip was prepared by preoperative scrubbing with povidone iodine and painted with povidone iodine solution and hip was draped under strict aseptic conditions. For dynamic hip screw (DHS) fixation, the surgery was carried out in supine position on fracture table under C-arm control in the standard manner. Cemented bipolar hemiarthroplasty (CBHP) was usually done under epidural/spinal anaesthesia. Patient was

kept in lateral position for cemented bipolar hemiarthroplasty which was done in a standard fashion using Hardinge's modification of anterolateral approach. Sometimes fixation of greater trochanter was needed which was accomplished by tension band wiring of the greater trochanter.

Immediate Post-operative protocol:

Postoperatively parenteral antibiotics (3rd generation cephalosporins) were given for 3 to 5 days. Drain was removed on 2nd postoperative day. Patients were ambulated with the help of walker on 2nd to 10th postoperative day depending upon the patient health status and stability of internal fixation. Sutures were removed on 12th postoperative day and patients were discharged. As the patients encompassed older age group and the bones were osteoporotic patients were given calcium citrate maleate and vitamin D and vitamin C supplements. None of the patients were given bisphosphonates preoperatively or postoperatively till the time of discharge.

Complications: In the immediate postoperative period patients were observed for the following complications.

Respiratory complications like hypostatic pneumonia, cardiovascular complications like myocardial infarction and cardiac failure in patients with hypertension and diabetes mellitus, wound infection (superficial or deep). Early superficial infection was managed by antibiotics and the removal of sutures to release wound tension and promote drainage. In deep infection, if there is presence of pus or hematoma from the wound on release of skin sutures, debridement and removal of the implant in extreme cases is recommended. These complications were less with bipolar prosthesis that were preassembled and fitted. Limb length discrepancy was noted in patients undergoing cemented bipolar hemiarthroplasty.

Results

Table 1: Characteristics of study participants

Characteristics	Cemented Bipolar Hemiarthroplasty (CBHP)	Percentage
Age-(Years)		
60-64	2	10
65-69	6	20
70-75	12	60
Sex		
Male	10	50
Female	10	50
Type of Fracture		
Type 2	18	90
Type 3	2	10
Limb Shortening		
Less than 2 cm	8	40
2-3 cm	11	55
3 cm	1	5

In our study, mean age of the patient was 69.4 yrs. Majority of the patients belonged to 70-75 years (60%) and 10 patients were male and 10 were females. 18 cases were of type 2 fractures, 2 cases were type 3 fracture. 8 patients had limb shortening of less than 2 cm, whereas 1 patient had limb shortening of 3 cm.

Table 2: Functional evaluation with Harris hip score in study participants

Harris Hip Score	CBHP	Percentage
Excellent (90-100)	0	0
Good (80-89)	0	0
Fair (70-79)	15	75%
Poor (<70)	2	10%
Died	3	15
Total	20	100%

As assessed by modified Harris hip score, excellent to fair results were obtained at 12 months follow up in 15 cases (75 %), 2 cases (10%) had poor results. 3 patients died postoperatively due to unrelated causes. In our series, we had no complications like stem loosening, periprosthetic fractures, and prosthetic dislocations.

Discussion

Intertrochanteric fractures are very common around the world. Injuries around the hip are a common problem in the elderly. There were an estimated 1.66 million hip fractures worldwide in 1990. [21] This worldwide annual number is rising rapidly [22] with an expected

incidence of 6.26 million by the year 2050. [21,23] An increase in these fractures is on the rise due to increased life expectancy of the people and osteoporosis, [24,25] so intertrochanteric fractures in the elderly patients are a frequent problem. These fractures are caused generally by trivial trauma like fall in bathroom or slipping while walking. The mainstay of operative treatment options of intertrochanteric fractures are extramedullary devices like dynamic hip screw and intramedullary fixation like gamma nailing and proximal femoral nailing. Stable fractures can be easily treated with osteosynthesis with predictable results.

Trochanteric fractures of femur are among the most common fractures encountered in orthopedic practice in the elderly. The specialty of a trochanteric fracture lies in the fact that it can be managed both conservatively and surgically. Internal fixation has the advantage of minimizing constant monitoring needed in conservative management. It also reduces the complications of prolonged immobilization like bed sores, hypostatic pneumonia and deep vein thrombosis. In recent years trend has changed from conservative to surgical management. The mainstay of treatment of intertrochanteric fractures is extramedullary devices like dynamic hip screw and intramedullary fixation like gamma nailing and proximal femoral nailing. The outcome of fixation depends mainly on quality of bone, age of patient, general health, trauma to surgery interval, adequacy of treatment, comorbidities, and stability of fixation. Intertrochanteric fractures in elderly often lead to confusion regarding treatment options between osteosynthesis and hemiarthroplasty. In this age group the fracture configuration is generally comminuted with presence of extensive osteoporosis.

Early mobilization is possible as the technique bypasses of fracture healing and provides immediate stability and mobility thereby avoiding the problems of prolonged recumbence. So to allow early post-operative weight bearing and to avoid excessive collapse at the fracture site, some surgeons have recommended bipolar prosthetic replacement for the treatment of comminuted osteoporotic intertrochanteric fractures. Hemiarthroplasty has been used for unstable intertrochanteric fractures since 1971, however less frequently as compared to femoral neck fracture. Its initial use was as a salvage procedure for failed pinning or other complications of dynamic hip screw. Green S et al [13], in 1987 conducted study on 20 elderly patients (average age, 82.2 years) with

unstable intertrochanteric hip fractures treated with a bipolar replacement. The earliest comparison of prosthetic replacement with internal fixation was undertaken by Haentjens et al. [26] The study involved 37 patients who were more than 75 years of age and operated with hemiarthroplasty with bipolar prosthesis. The results in this population were compared in a retrospective manner with 42 patients undergoing internal fixation with a blade plate. Patients treated with a cemented hemiarthroplasty were permitted immediate weight bearing.

Hardy et al. [27] studied 100 patients who had intertrochanteric fractures treated with compression hip screw and intramedullary hip screw. Operating time was significantly greater in intramedullary group, blood loss was lesser and perioperative complications were similar in both groups. However, there is only one study by Kim et al. [28] which compares the cement less calcar replacement prosthesis with proximal femoral nailing in a prospective study involving two groups of 29 patients. They could not find any significant difference concerning the functional outcomes, hospital stay, time to weight bearing or general complications but shorter operative time, less blood loss, fewer units of blood transfused, lower mortality rate was seen patients with proximal femoral nailing compared to cement less calcar replacement arthroplasty.

Ahmed Elmorsy et al. [29] in 2011 conducted prospective study on 41 patients (22 females and 19 males, all 65 years old or above) who had bipolar hemiarthroplasty for unstable intertrochanteric fractures. Modified lateral approach was used in all patients. In our study, mean age of the patient was 69.4 years which was comparable to other studies like the one conducted by Patil A et al. [30] in which it was 65.5 years. 8 patients had limb shortening of less than 2 cm, whereas 1 patient had limb shortening

of 3 cm. In studies by Atul patil et al. [30] 8 out of 126 patients, K.H. Sancheti et al. [31] 10 out of 37 patients and Nikunj Maru et al. [32] 5 out of 28 had limb shortening of an average of 1.1cm. [33]

As assessed by modified Harris hip score, excellent to fair results were obtained at 12 months follow up in 15 cases (75 %), 2 cases (10%) had poor results. 3 patients died postoperatively due to unrelated causes. In our series, we had no complications like stem loosening, periprosthetic fractures, and prosthetic dislocations.

Conclusion

The present study, reflected that primary cemented bipolar hemiarthroplasty in comminuted intertrochanteric fractures in elderly patients provides a painless stable joint allowing the patients to ambulate early in the postoperative period minimizing the complications associated with prolonged recumbency. Primary cemented hemiarthroplasty for unstable osteoporotic elderly trochanteric fractures appears to be a good alternative treatment modality. Early full weight bearing and rehabilitation is a definitive advantage of this method.

References

- Bhandari M, Devereaux PJ, Einhorn TA, Thabane L, Schemitsch EH, Koval KJ, Frihagen F, Poolman RW, Tetsworth K, Guerra-Farfán E, Madden K. Hip fracture evaluation with alternatives of total hip arthroplasty versus hemiarthroplasty (HEALTH): protocol for a multicentre randomised trial. *BMJ open*. 2015 Feb 1;5(2): e006263.
- Parker MJ, Gurusamy KS, Azegami S. Arthroplasties (with and without bone cement) for proximal femoral fractures in adults. *Cochrane database of systematic reviews*. 2010(6).
- Jameson SS, Lees D, James P, Johnson A, Nachtsheim C, McVie JL, Rangan A, Muller SD, Reed MR. Cemented hemiarthroplasty or hip replacement for intracapsular neck of femur fracture? A comparison of 7732 matched patients using national data. *Injury*. 2013 Dec 1;44(12):1940-4.
- Ftough S, Morga A, Swift C. Management of hip fracture in adults: summary of NICE guidance. *Bmj*. 2011 Jun 21;342.
- van den Bekerom MP, Hilverdink EF, Sierevelt IN, Reuling EM, Schnater JM, Bonke H, et al. A comparison of hemiarthroplasty with total hip replacement for displaced intracapsular fracture of the femoral neck: A randomised controlled multicentre trial in patients aged 70 years and over. *J Bone Joint Surg Br*. 2010; 92:1422-8.
- Hopley C, Stengel D, Ekkernkamp A, Wich M. Primary total hip arthroplasty versus hemiarthroplasty for displaced intracapsular hip fractures in older patients: systematic review. *BMJ*. 2010 Jun 11;340.
- Iorio R, Schwartz B, Macaulay W, Teeney SM, Healy WL, York S. Surgical treatment of displaced femoral neck fractures in the elderly: a survey of the American Association of Hip and Knee Surgeons. *The Journal of arthroplasty*. 2006 Dec 1;21(8):1124-33.
- Kim WY, Han CH, Park JI, Kim JY. Failure of intertrochanteric fracture fixation with a dynamic hip screw in relation to pre-operative fracture stability and osteoporosis. *International orthopaedics*. 2001 Dec; 25:360-2.
- Jensen JS, Tøndevold E, Mossing N. Unstable trochanteric fractures treated with the sliding screw-plate system: a biomechanical study of unstable trochanteric fractures III. *Acta Orthopaedica Scandinavica*. 1978 Jan 1;49(4):392-7.
- Kyle RF, Gustilo RB, Premer RF. Analysis of six hundred and twenty-two intertrochanteric hip fractures. *Orthopedic Trauma Directions*. 2010 Nov;8(06):25-9.

11. Broos PL, Rommens PM, Geens VR, Stappaerts KH. Pertrochanteric fractures in the elderly. Is the Belgian VDP prosthesis the best treatment for unstable fractures with severe comminution? *Acta Chirurgica Belgica*. 1991 Sep 1;91(5):242-9.
12. Harwin SF, Stern RE, Kulick RG. Primary Bateman-Leinbach bipolar prosthetic replacement of the hip in the treatment of unstable intertrochanteric fractures in the elderly. *Orthopedics*. 1990 Oct 1;13(10):1131-6.
13. Green S, Moore T, Proano F. Bipolar prosthetic replacement for the management of unstable intertrochanteric hip fractures in the elderly. *Clinical Orthopaedics and Related Research (1976-2007)*. 1987 Nov 1; 224:169-77.
14. Rodop O, Kiral A, Kaplan H, Akmaz I. Primary bipolar hemiprosthesis for unstable intertrochanteric fractures. *International orthopaedics*. 2002 Aug; 26:233-7.
15. Socci AR, Casemyr NE, Leslie MP, Baumgaertner MR. Implant options for the treatment of intertrochanteric fractures of the hip: rationale, evidence, and recommendations. *The bone & joint journal*. 2017 Jan;99(1):128-33.
16. Toro G, Moretti A, Ambrosio D, Pezzella R, De Cicco A, Landi G, Tammaro N, Florio P, Cecere AB, Braile A, Medici A. Fractures around trochanteric nails: the Vergilius classification system. *Advances in Orthopedics*. 2021 Jan 12; 2021:1-9.
17. Yang Z, Liu H, Xie X, Tan Z, Qin T, Kang P. Total hip arthroplasty for failed internal fixation after femoral neck fracture versus that for acute displaced femoral neck fracture: a comparative study. *The Journal of arthroplasty*. 2015 Aug 1;30(8):1378-83.
18. Cho SH, Cho HL, Cho H. Primary cementless hip arthroplasty in unstable intertrochanteric femur fracture in elderly: Short-term results. *Hip & Pelvis*. 2014 Sep 1;26(3):157-65.
19. Fusini F, Massè A, Risitano S, Ferrera A, Enrietti E, Zoccola K, Bianco G, Zanchini F, Colò G. Should we operate on all patients with COVID-19 and proximal femoral fractures? An analysis of thirty-, sixty-, and ninety-day mortality rates based on patients' clinical presentation and comorbidity: a multicentric study in Northern Italy. *International Orthopaedics*. 2021 Oct;45(10):2499-505.
20. Ju JB, Zhang PX, Jiang BG. Hip replacement as alternative to intramedullary nail in elderly patients with unstable intertrochanteric fracture: a systematic review and meta-analysis. *Orthopaedic surgery*. 2019 Oct;11(5):745-54.
21. Kannus P, Parkkari J, Sievänen H, Heinonen A, Vuori I, Järvinen M. Epidemiology of hip fractures. *Bone*. 1996 Jan 1;18(1): S57-63.
22. Rockwood PR, Horne JG, Cryer C. Hip fractures: a future epidemic? *Journal of orthopaedic trauma*. 1990 Jan 1;4(4):388-93.
23. Frandsen PA, Kruse T. Hip fractures in the county of Funen, Denmark: Implications of demographic aging and changes in incidence rates. *Acta orthopaedica Scandinavica*. 1983 Jan 1;54(5):681-6.
24. Hedlund R, Lindgren U. Trauma type, age, and gender as determinants of hip fracture. *Journal of orthopaedic research*. 1987;5(2):242-6.
25. Evans EM. The treatment of trochanteric fractures of the femur. *The Journal of bone and joint surgery. British volume*. 1949 May;31(2):190-203.
26. Haentjens P, Casteleyn PP, De Boeck H, Handelberg F, Opdecam P. Treatment of unstable intertrochanteric and subtrochanteric fractures in elderly patients. Primary bipolar arthroplasty compared with internal fixation. *JBJS*. 1989 Sep 1;71(8):1214-25.

27. Hardy DC, Descamps PY, Krallis P, Fabeck L, Smets P, Bertens CL, Delince PE. Use of an intramedullary hip-screw compared with a compression hip-screw with a plate for intertrochanteric femoral fractures. A prospective, randomized study of one hundred patients. *JBJS*. 1998 May 1;80(5):618-30.
28. Kim SY, Kim YG, Hwang JK. Cementless calcar-replacement hemiarthroplasty compared with intramedullary fixation of unstable intertrochanteric fractures: a prospective, randomized study. *JBJS*. 2005 Oct 1;87(10):2186-92.
29. Ahmed E, Mahmoud S, Mahmoud Z, Mahmoud H. Primary bipolar arthroplasty in unstable intertrochanteric fractures in elderly. *Open Journal of Orthopedics*. 2012 Mar 1;2012.
30. Patil A, Ansari M, Pathak A, Goregaonkar AB, Thakker CJ. Role of Cemented Bipolar Hemiarthroplasty for Comminuted Inter-trochanteric Femur Fracture in elderly osteoporotic patients through a modified Transtrochanteric approach “SION Hospital Modification”. *Journal of Dental and Medical Sciences*. 2013;9(4):40-7.
31. Sancheti KH, Sancheti PK, Shyam AK, 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 Aug; 44:428-34.
32. Dr. Nikunj Maru, Dr. Kishor Sayani, Unstable Intertrochanteric Fractures In High Risk Elderly Patients Treated With Primary Bipolar Hemiarthroplasty: Retrospective Case Series: *GUJARAT MEDICAL JOURNAL /DECEMBER–2013;68(2) :68-72*.
33. Chola J. M., Belrhiti Z., Dieudonné M. M., Charles K. M., Herman T. K., Didier C. K., Mildred C. C., Faustin C. M., & Albert M. T. The Severe Maternal Morbidity in the Kisanga Health Zone in Lubumbashi, South of the Democratic Republic of Congo. *Journal of Medical Research and Health Sciences*, 2022; 5(1): 1647–1652.