Original Article

Outcome of Primary Cemented Bipolar Hemiarthroplasty in Older Patients with Unstable Hip Fracture: A Prospective Study

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Abstract

Objective: Internal fixation as a classical method of treatment for unstable intertrochanteric fractures in older patients has significant complications and failure rate. This raises the need for a method that overcomes these difficulties and gives a better outcome. This study aims to evaluate the outcome of the use of primary cemented bipolar hemiarthroplasty in older patients with unstable intertrochanteric fracture both clinically and functionally. **Methods:** A prospective case series study conducted from January 2014 to February 2016 including 60 patients (>65-year-old) who were treated by primary cemented bipolar hemiarthroplasty for unstable intertrochanteric fractures (Kyle 3 and 4). Main outcome measurements were clinical and mechanical complications, mortality rate, and functional outcome. **Results:** Early mobilization was good, that 93.3% of patients started partial weight-bearing on the 1st postoperative day. At the final follow-up (mean 13.66 ± 5.9 months), the general and mechanical complications were few; 1-year mortality rate was 16.7%; the mean Harris Hip score was 91.14 ± 5.7. **Conclusions:** Primary cemented bipolar hemiarthroplasty offers early, pain-free mobility with minimal complications and good functional outcome in older patients with unstable intertrochanteric fracture.

Keywords: Bipolar, early ambulation, hemiarthroplasty, intertrochanteric hip fracture, osteosynthesis

Introduction

The intertrochanteric fracture is one of the most common fractures around the hip in older patients.[1,2] It constitutes up to 48% of all hip fractures and expected to increase due to the aging of population.[3] Usually, it results from low-energy trauma in most patients.[1]

The management of unstable intertrochanteric fractures in older patients is a challenge. Mainly due to the difficulty in obtaining anatomical reduction and the commonly associated comorbidities that lead to higher rates of morbidity and mortality.[4]

The treatment of choice of unstable intertrochanteric fractures in older patients for several decades has been internal fixation. Many studies have shown mechanical and technical failures of this type of treatment.[5-7]

Treatment with primary cemented bipolar hemiarthroplasty could speed up the return of activity of these cases to their preinjury level and reducing the postoperative morbidity caused by immobilization or fixation failure.[8]

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This study aims to evaluate the clinical and functional outcomes of primary cemented-hemiarthroplasty in older patients with unstable intertrochanteric fracture.

Materials and Methods

We prospectively followed 60 patients from January 2014 to February 2016 who were treated with primary cemented bipolar hemiarthroplasty - which has an additional artificial joint between the two components of the prosthesis - for unstable intertrochanteric fracture. We used total coverage sample during the study.

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The inclusion criteria were patients above 65-year-old with unstable intertrochanteric fractures (highly comminuted with loss of posteromedial buttress and/or reverse oblique or subtrochanteric extension). The exclusion criteria were stable fractures and pathological fracture.

They were treated by the same orthopedic surgeon in the same hospital as soon as the condition of the patient was stabilized, usually within 72 h (average 34 ± 2.9 h) after their admission. Structured data sheet used to report demographic data. Fracture type was classified according to Kyle classification.[9] All patients received 1.5 g of cefuroxime at the time of induction of anesthesia and continued twice a day intravenously for 48-h postoperatively as prophylaxis. In addition, they received 4000 IU of low molecular weight heparin for 4 weeks' postoperatively. We reported the perioperative parameters including duration of surgery, weight-bearing status, duration of admission, time to full weight bearing, and clinical complications. The postoperative interval of follow-up was at 2, 6, and 12 weeks and at the final follow-up (mean 13.66 ± 5.9 months). The functional outcome was assessed by Harris Hip Score (HHS) at 3 months and at the final follow-up.

Surgical procedure

In the lateral decubitus position, surgery was done through a Hardinge approach. The comminuted proximal femoral fragments were removed. The greater trochanter with abductor attachment was preserved and reattached with cerclage wire through drilling holes to the bone after canal preparation, without complications, and with good union during the follow-up period. Bone cement applied using finger packing, then bipolar prosthesis was applied. The implant used was the Link SP II hip prosthesis produced by Waldemar Link-Hamburg [Figures 1 and 2].

Data analysis

The collected data were analyzed with the Statistical Package for Social Sciences version 21 (IBM, Armonk, NY, USA).

Figure 1: Preoperative X-ray of 76-year-old man with an unstable comminuted hip fracture

Results

We recruited 60 patients in this study. Their demographic and clinical data were shown in Table 1. Patients were followed for 18 months with the mean follow-up time of 13.66 ± 5.9 months [Table 1].

Fifty-six patients (93.3%) were operated in <2 h with a mean operative time of 109 ± 7.2 min. Mobilization in bed was done for all patients on the same day of operation; 93.3% started partial weight bearing on the 1st postoperative day; and at the end of the 1st week, 85.2% started full weight bearing.

Majority of patients (93.3%) were hospitalized for <1 week. The mean HHS at 12 weeks' postoperatively was 77.85 ± 8.9.

At the final follow-up, 10 (16.7%) of the 60 patients had died and 2 (3.3%) were lost to follow-up. Two patients died due to pulmonary embolism, one after 6 weeks and the other one after 12 weeks' postoperatively; one patient died due to sepsis after 6 weeks' postoperatively. For the rest, the cause of death was unknown and occurred after 12 months' postoperatively. Considering complications; 3 (5%) patients had infections; two had a deep infection (deep to superficial fascia) necessitated removal of implants, one managed with resection arthroplasty, the other one was revised later

Table 1: Main demographic and clinical data

Parameter	Cemented bipolar
Mean age (years)±SD	76.15±7.2
Male:female	23:37
Fracture type (%)	
Kyle 3	41.7
Kyle 4	58.3
Mode of trauma (%)	
Domestic fall	96.7
Mean follow-up±SD	13.66±5.9
Co-morbidities	
DM	19
None	41

SD: Standard deviation, DM: Diabetes mellitus

Figure 2: Postoperative X-ray after reconstruction with cemented bipolar

with 2nd stage after exclusion of infection. The third one had superficial infection managed with debridement and intravenous antibiotics. The isolated organism in all was *Staphylococcus aureus*. Two (3.3%) patients were complicated with deep venous thrombosis (DVT) and 5 (8.3%) patients had bedsores, but three of them had bedsores before the operation. We had only one (1.7%) patient with hip dislocation due to dashboard injury, which was reduced surgically. The mean HHS at the time of final follow-up was 91.14 ± 5.7. Majority of the patients (96.7%) had a pain-free mobile hip with an adequate amount of flexion, abduction, and rotation. The reoperation rate was 5% (three cases) [Table 2].

Discussion

Many older patients with unstable intertrochanteric hip fractures have osteoporosis. These fractures in older patients are usually associated with severe displacement and comminution. Thus, anatomical reduction of these fractures is difficult to obtain and maintain, often ending with malunion, nonunion, or reduction failure.[10] Internal fixation greatly reduced the mortality associated with intertrochanteric fractures in the older patients[11] but with a high failure rate due to poor bone quality, which is secondary to age-related osteoporosis.[12] To reduce the complications associated with internal fixation, many authors have recommended prosthetic replacement for the treatment of unstable intertrochanteric fractures with improved outcome.[13-20] In addition, hip replacement is usually the salvage procedure in elderly patients after failure of internal fixation of intertrochanteric fractures.[12,17] A good outcome is expected in most patients with improved function and good pain relief after the replacement.[17]

In this study, which included 60 patients all underwent primary cemented bipolar hemiarthroplasty for the treatment of unstable intertrochanteric fractures, the mean age of our patients was 76.15 years, which is similar to Sancheti *et al*. and Sinno *et al*. studies[21,22] About 62% of our patients were females, this is comparable to Sinno *et al*.[22] study (68.6%). The majority of our cases (51.3%) were type 4 according to Kyle classification, unlike Rodop *et al*.[19] study where the majority were type 3. As in all other studies,[13-22] simple domestic fall is the main cause of fractures. Most of the cases in our study were hospitalized for <1 week and Sinno *et al*.[22] reported a similar result, while in Sancheti *et al*.[21] study it was about 11 days. We reported the mean operative time to be 109 ± 7.2 min, in other studies, it ranged from 71 min in Maru and Sayani study[4] and Sancheti *et al*.,[21] to 116 ± 14 min in Kumar *et al*.[23] study. More than 90% of our cases started mobilization in the 1st postoperative day, unlike Sinno *et al*.[22] where only 68.6% started mobilization on the 1st day.

Table 2: Clinical and mechanical complications in the study group

Complication	Percentage
Infection	5
Deep	3.3
Superficial	1.7
DVT	3.3
Bedsore	8.3
Dislocation	1.7
Mortality	16.7

DVT: Deep venous thrombosis

Our 1-year mortality rate was 16.7%, which is slightly more than Elmorsy *et al*.[24] and Grimsrud *et al*.[25] who reported (12.19%) and (10.3%), respectively. We had a 5% infection rate whereas Stern[26] reported 6.8% and Stern and Angerman[16] reported 2.8%. Two (3.3%) patients had DVT and 5 (8.3%) cases had bed sores, two of them had bedsores preoperatively. Grimsrud *et al*.[25] reported one case of DVT and two cases of bed sores postoperatively; all were nonambulant postoperatively; this shows the importance of mobility after surgery, which is one of the main aims of this treatment. Elmorsy *et al*.[24] reported no DVT or bedsores.

We reported one case with a dislocation, which was reduced surgically. Elmorsy *et al*.[24] and Rady *et al*.[27] reported a similar result in their studies. We did not report any case of periprosthetic fracture while in Maru and Sayani[4] and Sancheti *et al*.[21] studies, they reported one case of periprosthetic fracture each.

The mean HHS at the time of final follow-up was 91.14 in our series, while Maru and Sayani[4] reported their HHS at the final follow-up to be 84.8, Elmorsy *et al*.[24] 78.19, Kumar *et al*.[23] 75 and Choy *et al*.[28] 80.6; this shows that we had better results in our series, possibly because of the relatively earlier intervention.

Three cases (5%) were re-operated, two for deep infection and one for reduction of a dislocation; in Elmorsy *et al*.[24] series there were 4 (9.7%) cases of re-operation; one for infection, one case for subsidence, and one case for dislocation where an open reduction was done and one for acetabular wear. Rady *et al*.[27] reported 2 (4.1%) cases re-operation rate; one for reduction of a dislocation and one for infection.

Our limitation is a relatively short period of follow-up and a relatively small number of patients.

Conclusions

Primary cemented bipolar hip hemiarthroplasty may offer a good option in the treatment of unstable intertrochanteric fractures in older patients. The early mobilization and decreased complications are the most important advantages of this approach. A comparative study with internal fixation group, a larger number of patients and longer duration of follow-up is recommended.

Ethical consideration

Ethical approval was obtained from the Research Ethics Committee of the Sudan Medical Specialization Board and informed consent was obtained from all participants.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

Author contributions

ASE conceived and designed the study, conducted research, provided and organized data. AHA and ASE collected, analyzed, and interpreted data. ASE, AHA, and YNG review the literature. ASE and YNG wrote initial and final draft of the article. EME did all surgeries, provided research material and logistic support. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

References

1. Yang YH, Wang YR, Jiang SD, Jiang LS. Proximal femoral nail antirotation and third-generation gamma nail: Which is a better device for the treatment of intertrochanteric fractures? Singapore Med J 2013;54:446-50.
2. Huang H, Xin J, Ma B. Analysis of complications of intertrochanteric fracture treated with gamma 3 intramedullary nail. Int J Clin Exp Med 2014;7:3687-93.
3. Yoon BH, Lee YK, Kim SC, Kim SH, Ha YC, Koo KH, *et al.* Epidemiology of proximal femoral fractures in South Korea. Arch Osteoporos 2013;8:157.
4. Maru N, Sayani K. Unstable intertrochanteric fractures in high risk elderly patients treated by primary bipolar hemiarthroplasty: Retrospective case series. Gujarat Med J 2013;68:68-72.
5. Haynes RC, Pöll 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.
6. Wolfgang GL, Bryant MH, O'Neill JP. Treatment of intertrochanteric fracture of the femur using sliding screw plate fixation. Clin Orthop Relat Res 1982;163:148-58.
7. Simpson AH, Varty K, Dodd CA. Sliding hip screws: Modes of failure. Injury 1989;20:227-31.
8. Pradeep C, Anuj A, Abhishek G. Treatment of comminuted unstable inter-trochanteric fracture in elderly patients with cemented bipolar prosthesis. Indian J Orthop Surg 2015;1:255-60.
9. Kyle RF. Fractures of the proximal part of the femur. J Bone Joint Surg 1994;76A: 924-50.
10. Kang SY, Lee EW, Kang KS, Song KS, Lee S, Park YU, *et al*. Mode of fixation failures of dynamic hip screw with TSP in treatment of unstable proximal femur fracture: Bio-mechanical analysis and a report of 3 cases. J Korean Orthop Assoc 2006;41:176-80.
11. Chang JD, Kim IS, Lee SS, Yoo JH, Hwang JH. Unstable intertrochanteric versus displaced femoral neck fractures treated with cementless bipolar hemiarthroplasty in elderly patients; a comparison of 80 matched patients. Orthop Traumatol Surg Res 2016;102:695-9.
12. Hassankhani EG, Kashani FO, Hajitaghi H, Hassankhani GG. How to treat the coplex intertrochanteric fractures in elderly patients, DHS or arthroplasty? Arch Bone Joint Surg 2014;2:174-9.
13. 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;13:1131-6.
14. Broos PL, Rommens PM, Deleyn PR, Geens VR, Stappaerts KH. Pertrochanteric fractures in the elderly: Are there indications for primary prosthetic replacement? J Orthop Trauma 1991;5:446-51.
15. Chan KC, Gill GS. Cemented hemiarthroplasties for elderly patients with intertrochanteric fractures. Clin Orthop Relat Res 2000;371:206-15.
16. Stern MB, Angerman A. Comminuted intertrochanteric fractures treated with Lienbach prosthesis. Clin Orthop 1987;218:75-80.
17. Naik LG, Badgire KS, Sharma JM, Qureshi F. Treatment of unstable intertrochanteric fractures with cemented bipolar prosthesis – A prospective study. Indian J Orthop Surg 2017;3:27-30.
18. 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. J Bone Joint Surg Am 1989;71:1214-25.
19. Rodop O, Kiral A, Kaplan H, Akmaz I. Primary bipolar hemiprosthesis for unstable intertrochanteric fractures. Int Orthop 2002;26:233-7.
20. Abdelgadir AH, Awadelsied MH, Elbushra EM, Gashi YN. Outcome of cemented bipolar as primary management of comminuted unstable intertrochanteric fracture femur in elderly Sudanese patients. Univ J Public Health 2016;4:133-8.
21. Sancheti KH, 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 J Orthop 2010;44:428-34.
22. Sinno K, Sakr M, Girard J, Khatib H. The effectiveness of primary bipolar arthroplasty in treatment of unstable intertrochanteric fractures in elderly patients. N Am J Med Sci 2010;2:561-8.
23. Kumar GN, Meena S, Kumar NV, Manjunath S, Raj MK. Bipolar hemiarthroplasty in unstable intertrochanteric fractures in elderly: A prospective study. J Clin Diagn Res 2013;7:1669-71.
24. Elmorsy A, Saied M, Allah AA, Zaied M, Hafez M. Primary bipolar arthroplasty in unstable intertrochanteric fractures in elderly. Open J Orthop 2012;2:13-7.
25. Grimsrud C, Monzon RJ, Richman J, Ries MD. Cemented hip arthroplasty with a novel cerclage cable technique for unstable intertrochanteric hip fractures. J Arthroplasty 2005;20:337-43.
26. Stern R. Are there advances in the treatment of extracapsular hip fractures in the elderly? Injury 2007;38 Suppl 3:S77-87.
27. Rady AE, Sharaf AA, Abuelela AA. "Primary Bipolar Hemiarthroplasty in Unstable Intertrochanteric Fractures in Elderly" 24th SICOT Meeting (International Society for Orthopaedic Surgery and Traumatology), Cairo; 2003.
28. Choy WS, Ahn JH, Ko JH, Kam BS, Lee DH. Cementless bipolar hemiarthroplasty for unstable intertrochanteric fractures in elderly patients. Clin Orthop Surg 2010;2:221-6.