# OUTCOMES OF LONG-STEM CEMENTLESS HEMIARTHROPLASTY FOR UNSTABLE INTERTROCHANTERIC FEMORAL FRACTURES IN GERIATRIC PATIENTS: A TWO-YEAR FOLLOW-UP STUDY

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**Abstract**

***Objectives:*** To assess the clinical outcomes of primary long-stem cementless bipolar hip arthroplasty as a treatment option for unstable intertrochanteric femoral fractures in geriatric patients. ***Methods:*** A retrospective study was conducted on 67 elderly patients aged > 70 years old with unstable intertrochanteric femoral fractures. Clinical outcomes were assessed based on the duration of walking without support, length of hospital stay, mortality rate, Harris Hip scores (HHS), and postoperative complications. ***Results:*** The mean age of patients was 84.34 ± 6.67. Fracture types included 43 cases of A2.2, 19 cases of A2.3, and 5 cases of A3.1. The mean follow-up duration was 27.89 ± 10.24 months. The mean duration of hospitalization was 15.37 ± 5.09 days. Median HHS at the last follow-up was 81.61 ± 7.06. Postoperative complications were four cases of pulmonary infection and one case of postoperative dislocation. During follow-up, the postoperative mortality rate was 5.97%. ***Conclusions:*** Primary cementless bipolar hemiarthroplasty is a secure and effective choice for the treatment of intertrochanteric femoral fracture in the elderly.

**Keywords:** Hemiarthroplasty; Geriatric patient; Intertrochanteric fracture; Cementless bipolar; Long-stem.

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## INTRODUCTION

Intertrochanteric femoral fractures are one of the most important causes of functional failure and death among senior citizens, often resulting from low-energy trauma in the setting of osteoporosis, with over 150,000 patients reported annually in the United States [1]. The mortality rate of the elderly was 11.7 times greater than that of a population with similar characteristics after the first-year follow-up [2] since a period of restricted functional results in chronic comorbidities, including cardiovascular and pulmonary diseases. At present, various treatment options are available for intertrochanteric fractures, such as hip hemiarthroplasty, bone fusion, and conservative management. Each approach comes with its unique set of benefits, drawbacks, and specific indications for use. The main purpose is to achieve preinjury ambulation status and functional recovery as early as possible. Consequently, bipolar hemiarthroplasty becomes popular in the elderly population with earlier weight-bearing training and the same functional outcome compared to internal fixation [3]. Nowadays, it is still debatable whether cementless or cemented is a better option. Cemented stem provides quick prosthesis stability, but there is a risk of cement-related fatal cardiovascular complications, especially in the elderly with chronic conditions. On the other hand, few reports are found investigating cementless long-stem arthroplasty in the treatment of intertrochanteric fracture in the elderly. While cementless long-stem was often used for revision, some orthopedic doctors thought that long-stem cementless prosthesis was an option for primary hemiarthroplasty with additional stability. Our study aims to: *Evaluate the clinical outcomes of bipolar hemiarthroplasty using cementless long-stem in the treatment of unstable intertrochanteric femoral fracture in geriatric patients.* By addressing the existing gaps in the literature, this study may contribute to optimizing treatment strategies and improving the quality of care.

## MATERIALS AND METHODS

### 1. Subjects

Including 67 patients (> 70 years old) who underwent bipolar hemiarthroplasty using cementless long-stem for unstable intertrochanteric femoral fracture at Military Hospital 103 from September 2020 to August 2023.

Retrospective data collected before surgery includes age, gender, fracture site, AO fracture classification, time

from hospitalization to intervention, time from trauma to hospitalization, cause of fracture, follow-up period, type of anesthesia, and comorbidities.

Low-molecular-weight heparin (enoxaparin) is given to patients until 12 hours preoperatively and 5 days postoperatively. The patients were under the spinal cord or general anesthesia. Procedures were performed by a standard direct-lateral approach. For rehabilitation, passive range of motion exercises were started on the first postoperative day, and partial weight-bearing exercises were started on 4 postoperative days.

**2. Methods**

* *Study design:* A retrospective study.

* *Study variables:* For clinical assessment, HHS was investigated at the last follow-up examination; length of hospitalization, mortality rate, and time from surgery to walking without support (cane, sticks, or walker) were recorded. Complications related to surgery were sought for their presence.

* *Statistical analysis:* Our data were loaded into the Microsoft Excel program, analyzed, and calculated by the medical statistics software SPSS 26.0, and the results were expressed in median (minimum, maximum) and standard deviation.

**3. Ethics**

The study received approval from the Institutional Ethics Committee. The Department of Joint Surgery at Military Hospital 103 granted permission for the utilization and publication of the research data. The authors are responsible for all aspects of the work to ensure that issues regarding the accuracy of any part of this study. Patients' data were kept confidential throughout the study to protect the anonymity of their information, and all participants gave written informed consent at the time of participation. The authors received no financial support and declare no conflicts of interest regarding the research, authorship, and publication of this article.

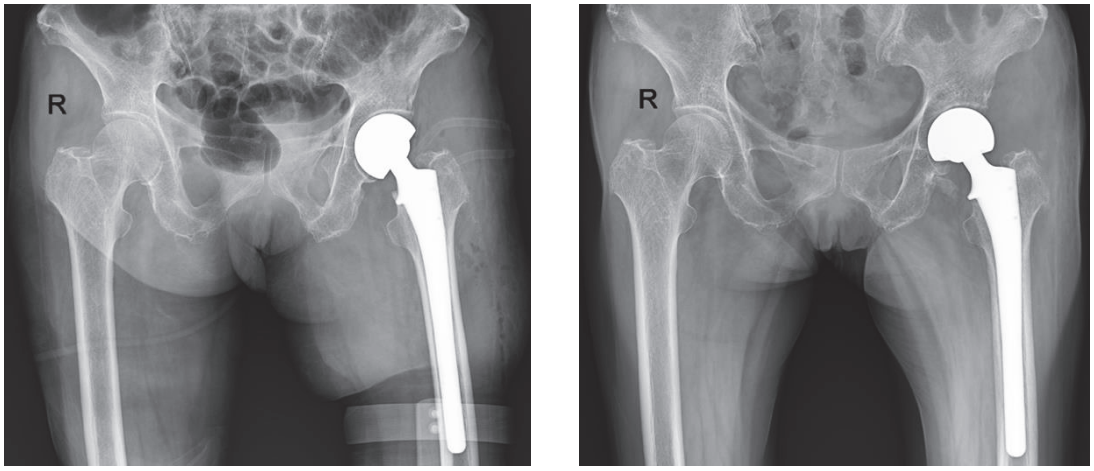
## RESULTS

The preoperative data of 67 patients was shown in table 1. All patients underwent successful surgery, of which 31.34% were male and 68.66% were female. The average duration of hospitalization was from 8 - 38 days, and the mean follow-up period was from 12 - 44 months. Most patients with chronic preexisting diseases in which the group accounted for the highest rate of hypertension with 34%. According to the AO fracture classification, there were 64.17% type A2.2, 28.35% type A2.3, and 7.46% type A3.1.

**Table 1.** Demographic and clinical characteristics of patients (n = 67).

| Characteristics | Values |
|---|---|
| Mean age (years) | 84.34 ± 6.67 (71 - 98) |
| Male/female | 21/46 |
| Right/left side | 23/44 |
| Follow-up period (months) | 27.89 ± 10.24 |
| Time from hospitalization to surgery (days) | 4.92 ± 2.96 |
| Cause of fracture | |
| Road traffic accident | 12 (17.9%) |
| Slip and fell | 55 (82.1%) |
| Time from trauma to hospitalization | |
| < 24h | 28 (41.8%) |
| 24 - 48h | 22 (32.8%) |
| > 48h | 17 (25.4%) |
| AO/OTA fracture type | |
| A2.2 | 43 (64.2%) |
| A2.3 | 19 (28.3) |
| A3.1 | 5 (7.5%) |
| Metabolic disease (No. of patients) | |
| Cardiovascular disease | 12 (17.9%) |
| Pulmonary disease | 5 (7.4%) |
| Diabetes | 12 (17.9%) |
| Hypertension | 23 (34.3%) |
| Anesthesia mode (n) | |
| General | 8 (11.9%) |
| Spinal | 59 (88.1%) |

The postoperative outcomes are shown in table 2. The average HHS was 81.61 ± 7.06 (range: 60 - 92) at the final follow-up, of which 16.41% were excellent and 58.2% were good. Before discharge from the hospital, all of them were treated. According to functional ambulation, 47.76% of patients walked without the help of aids at 3 months after the operation and 71.64% after 12 months. 19 patients delayed ambulation, 12 due to generalized weakness, and 7 due to associated concomitant fractures.




A B

**Figure 1.** Postoperative radiographs were taken immediately after surgery (A) and at the 2-year follow-up (B).

As a complication, there was 1 case of dislocation of the prosthesis head, which was manually reduced without any recurrence. 4 cases showed pulmonary infection, and 1 case showed urinary tract infection. There was not any case of surgical infection or deep vein thrombosis. In addition, 4 of them were lost by natural death (5 - 10 months post-surgery).

**Table 2.** Postoperative results of patients (n = 67).

| Results | Values |
|---|---|
| Mean HHS | |
| Excellent (n) | 11 (16.4%) |
| Good (n) | 39 (58.2%) |
| Fair (n) | 15 (22.4%) |
| Poor (n) | 2 (3%) |
| Total hospitalisation (days) | 15.37 ± 5.09 |
| Postoperative hospital stay (days) | 8.21 ± 4.43 |
| Walking without support | |
| At 3 months (n) | 32 (47.7%) |
| At 6 months (n) | 40 (59.7%) |
| At 12 months (n) | 48 (71.6%) |

| | Values |
|---|---|
| Mortality rate | |
| 0 - 3 months (n) | 0 |
| 3 - 12 months (n) | 3 (4.5%) |
| 12 - 24 months (n) | 1 (1.5%) |
| Complications | |
| Dislocation (n) | 1 (1.5%) |
| Pulmonary infection (n) | 4 (5.9%) |
| Urinary tract infection (n) | 1 (1.5%) |

## DISCUSSION

Unstable intertrochanteric fractures are among the most complex fractures in elderly patients. The primary goal of surgical treatment is to restore pre-fracture function and ambulatory status as quickly as possible. However, the optimal treatment for intertrochanteric fractures in the elderly remains a topic of debate. Osteosynthesis is often the preferred method; however, geriatric patients frequently have chronic comorbidities that increase the risk of osteosynthesis failure, necessitating revision to hemiarthroplasty. In our study, most patients had underlying conditions, including hypertension (34%), diabetes mellitus (17.9%), and cardiovascular accidents (17.9%). Primary hip replacement following intertrochanteric fracture is typically indicated for cases with degenerative hip disease, extensive comminution, or poor bone quality [4].

When compared with the results of proximal femoral nail anti-rotation, Chengkui Cai et al. assessed 70 patients aged > 70 years and reported that joint replacement allowed earlier mobilization post-surgery and better joint function within 12 months [5]. In our study, we utilized a cementless long femoral stem for elderly patients with intertrochanteric fractures, and 32/67 patients (47.76%) achieved independent ambulation within three months.

Shan Fan et al. investigated the clinical efficacy of locking compression plate fixation in 37 patients with femoral intertrochanteric fractures, reporting complications including deep vein thrombosis (3 patients), bedsores (1 patient), and delayed union (1 patient) [6]. Our findings indicated a general complication rate of 8.95%, with no cases of deep vein thrombosis.

Previous research suggests that cemented prostheses provide immediate

stability due to the cement-bone mechanical interlock. However, disadvantages such as prolonged surgical time and the risk of cement implantation syndrome, which can be life-threatening, have been noted [7]. Conversely, uncemented prostheses offer a faster and technically simpler procedure. Some authors have even argued that cementless implantation results in a lower risk of readmission, mortality, and postoperative complications compared to cemented procedures [8]. In our study, 4 patients (5.9%) were lost to follow-up due to natural death over a two-year period.

When compared to our findings, Qiang Mao et al. [9] observed a 6.9% mortality rate among 53 patients who underwent hemiarthroplasty using an uncemented long femoral stem for intertrochanteric fractures. They utilized the Peerless-160 long femoral stem for octogenarians, reporting an average HHS of 87.8 ± 6.1 at the final follow-up. Similarly, a retrospective study by Gema et al. [10] on 179 patients found a mean follow-up HHS of 85.28 ± 10.3, with a mean patient age of approximately 74.5 ± 8.1 years. In our study, the average HHS was 81.61 ± 7.06; however, our patients were older, with a mean age of 84.34 ± 6.67 years.

This study had several limitations, including a small sample size and a limited follow-up period. Additionally, the retrospective design makes the study susceptible to bias and confounding factors that may influence the results. Future research will explore these issues in greater detail.

## CONCLUSION

The results of this study show that primary bipolar cementless long-stem hemiarthroplasty is the secure and effective option in the treatment of unstable intertrochanteric femoral fracture, yielding good functional outcomes. To enhance the reliability of the findings, a larger number of patient cohorts and a longer follow-up period should be required.

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