

LONG-TERM RESULTS OF HEMIARTHROPLASTY IN THE TREATMENT OF INTERTROCHANTERIC FRACTURE

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Abstract

Objectives: To evaluate the long-term outcomes of patients ≥ 70 years old with intertrochanteric fractures treated with hemiarthroplasty. **Methods:** A retrospective longitudinal, uncontrolled study was conducted on 40 patients aged ≥ 70 years with intertrochanteric fractures who underwent hemiarthroplasty in the Joint Surgery Department, Trauma and Orthopaedics Center, Military Hospital 103 in 2019 and 2020. Complications, Barthel index (BI), and mortality rate (at 30 days, 1 year, and 5 years after surgery) were recorded. **Results:** The mean age of patients was 82.0 ± 6.31 years (range: 70 - 93 years). 25% (10/40) of the patients sustained complications. The most common complication was delirium (4/40 of the patients). 38 patients (95%) survived at 1 year postoperatively, and 28 patients (70%) survived at 5 years postoperatively. The mean BI was 90.66 ± 14.76 (range: 35 - 100) at 1 year, and 88.39 ± 16.83 (range: 35 - 100) at 5 years after surgery. **Conclusion:** Patients ≥ 70 years of age with intertrochanteric fractures who underwent hemiarthroplasty had a BI score of 88.39 ± 16.83 at 5 years postoperative, and a 5-year mortality rate of 30%. Postoperative complications were associated with a higher long-term mortality rate.

Keywords: Long-term result; Hemiarthroplasty; Intertrochanteric fracture.

INTRODUCTION

Intertrochanteric fracture is a common injury among elderly people [1]. Elderly hip fractures are linked to a high rate of comorbidity and death. These patients

require surgery to avoid complications due to prolonged lying down, such as pneumonia and pressure ulcers. These are the main causes of death in elderly patients with hip fractures. The type of

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implant chosen is very important because it affects these individuals' survival and functional outcomes. Intramedullary nailing is the most common surgical procedure for intertrochanteric fractures. However, geriatric patients usually have an unstable fracture and osteoporosis. This makes early postoperative resumption of full weight-bearing difficult due to the risk of non-union, implant failure, and cut-out complications. Recent studies have demonstrated the safety and efficacy of hemiarthroplasty in intertrochanteric fractures in older patients. This surgery allows early full weight-bearing and prevents collapse in the fracture area.

Numerous short-term studies show a poor functional outcome following hip fracture surgery, which results in limited mobility and self-reliance in activities of daily living. EL Goh et al. (2020) studied 8,673 participants and reported that the rate of complications directly related to surgery was 39%, 12% were medical complications, and the rate of death was 12.2% at 120 days after surgery [2]. According to Zorg et al. (2014), 49% of patients with hip fractures returned to independent living, 37% entered a nursing home, 10% entered a sanatorium, and 4% died during hospitalization [3]. In a

study by Luthje et al., 8 years after surgery, 9% of 221 patients with hip fractures were reoperated, and 74% of the patients had died [4]. Currently, most studies in Vietnam only evaluate short-term or medium-term results; very few studies report long-term results in this group of patients. Therefore, our study aims to: *Evaluate the long-term results of patients with intertrochanteric fractures who underwent hemiarthroplasty with a 5-year follow-up.*

MATERIALS AND METHODS

1. Subjects

Including 40 patients aged ≥ 70 years with intertrochanteric fractures who underwent hemiarthroplasty in the Joint Surgery Department, Trauma and Orthopaedics Center, Military Hospital 103 in 2019 and 2020.

** Inclusion criteria:* Patients aged ≥ 70 years; patients with intertrochanteric fractures who underwent hemiarthroplasty; patients had complete X-ray films and medical records; patients were available to contact.

** Exclusion criteria:* Pathological fractures; polytraumatism; periprosthetic fractures; patients with malignant disease.

2. Methods

* *Study design:* A retrospective longitudinal, uncontrolled study.

* *Definition of variables:* Data on age, sex, comorbidities (hypertension, diabetes, cardiovascular, lung disease, chronic stroke, chronic renal failure), type of fracture (according to AO/OTA classification), type of implant (cemented stem or uncemented stem), complications, readmission, BI, and mortality rate (at 30 days, 1 year, 5 years) were recorded for each patient.

We assessed the patients' functional outcomes 5 years following surgery using the BI [5]. Complications: Medical complications (delirium, pneumonia, heart failure, deep venous thrombosis (DVT), pulmonary embolism, gastrointestinal bleeding, gastrointestinal perforation, urinary tract infections, acute kidney failure, sepsis, and stroke). Surgical complications (deep wound infections, superficial wound infections, hip dislocation, fracture of the femur, and loosening of the femoral components).

* *Study procedure:* Medical records were reviewed to collect variables related to patient characteristics and complications. Telephone interviews

were conducted with patients or their relatives to obtain data on postoperative complications, functional outcomes, and survival outcomes.

* *Statistical analysis:* The SPSS® software for Windows®, version 20.0 was used to analyze the data. Quantitative variables: Data were displayed as maximum, minimum values, and mean $\pm$ standard deviation (SD). Qualitative variables were presented by frequency and ratio. The ANOVA test was used to assess the statistical significance of the differences among three age groups. The survival curves of male and female patients, complicated and uncomplicated patients were compared using Kaplan-Meier curves and the log-rank test. A significance of 5% was used.

3. Ethics

The study was conducted in accordance with the regulations of Military Hospital 103 and Vietnam Military Medical University. The data used in this study were collected and analyzed with the approval of Military Hospital 103, Vietnam Military Medical University. The authors of this study declare to have no conflicts of interest.

RESULTS

1. Patient characteristics

Patient characteristics are presented in table 1.

Table 1. Patient characteristics.

	Variables	Value	Total
Age (years)	Mean	82.0 ± 6.31	
	Min - Max	70 - 93	
Gender	Male	10 (25.0%)	40
	Female	30 (75.0%)	
Type of fracture	A1	10 (25.0%)	40
	A2	30 (75.0%)	
Type of implant	Cemented stem	25 (62.5%)	40
	Cementless stem	15 (37.5%)	
Comorbidity	Hypertension	19 (47.5%)	
	Diabetes	3 (7.5%)	
	Delirium	1 (2.5%)	
	Chronic stroke	4 (10%)	
	Chronic kidney disease	1 (2.5%)	
	Chronic pulmonary disease	1 (2.5%)	
	Other	1 (2.5%)	
	None	17 (42.5%)	

A total of 40 consecutive patients with an acute intertrochanteric fracture were enrolled in the study. The rate of male/female was 1/3. There were 13 (32.5%) patients from 70 - 79 years, 22 (55.0%) from 80 - 89 years, and 5 (12.5%) from 90 - 93 years. Table 1 shows that hypertension was the most prevalent disease (47.5%), followed by chronic stroke (10%). Some patients had more than one comorbidity.

2. Functional outcomes

Table 2. Evaluation of functional outcomes using the BI at 1 year and 5 years postoperatively.

Age group	BI at 1 year postoperatively		BI at 5 years postoperatively	
	Mean $\pm$ SD	p	Mean $\pm$ SD	p
70 - 79	90.77 $\pm$ 16.54		83.50 $\pm$ 27.29	
80 - 89	92.75 $\pm$ 8.81	0.355	91.43 $\pm$ 5.70	0.53
90 - 93	82.00 $\pm$ 26.60		90.00 $\pm$ 7.07	
Total	90.66 $\pm$ 14.76		88.39 $\pm$ 16.83	

38 patients (95%) survived at 1 year postoperatively, and only 28 patients (70%) survived at 5 years postoperatively. The mean BI was 90.66 ± 14.76 (range: 35 - 100) at 1 year postoperatively, and 88.39 ± 16.83 (range: 35 - 100) at 5 years postoperatively; the difference was not statistically significant ($p = 0.156$).

3. Complications

Table 3. Complications.

Complications	Frequency (n)	Percentage (%)
Delirium	4	10
Pneumonia	2	5
Heart failure	1	2.5
Stroke	3	7.5
Sepsis	1	2.5
Urinary tract infection	1	2.5
Wound infection	2	5
None	30	75

In this study, 25% (10/40) of the patients sustained complications. The most common complication was delirium in 4/40 of the patients, followed by acute stroke in 3/40 of the patients (*Table 3*). During the follow-up, 40% (4/10) of the patients with complications needed readmission, including 1 patient readmitted due to deep wound infection, pneumonia, and delirium; 1 patient due to urinary tract infection; 1 patient due to stroke; and 1 patient due to diabetes. There was only 1 patient who needed reoperation to debride the infected wound. Some patients had 2 to 3 complications at the same time, such as 1 patient suffered delirium, deep wound infection, and pneumonia.

4. Mortality

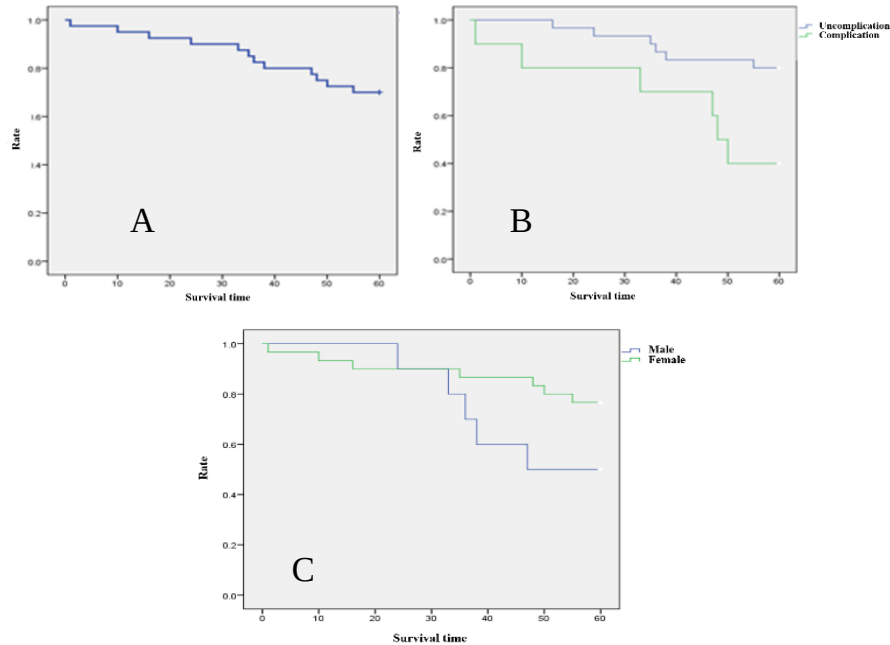


Figure 1. A. Survival estimation after surgery. B. Survival estimation after surgery for complications. C. Survival estimation after surgery for gender.

At 30 days, 1 year, and 5 years following surgery, the overall mortality incidence was 2.5%, 5%, and 30%, respectively. There was only 1 patient who died from surgery-related causes during the 30-day postoperative period, with death attributed to complications of pneumonia and sepsis. There was no significant difference in the mortality rate between males and females ($p = 0.101$). At each follow-up, the mortality rate of the complicated group was higher than that of the uncomplicated group ($p = 0.011$).

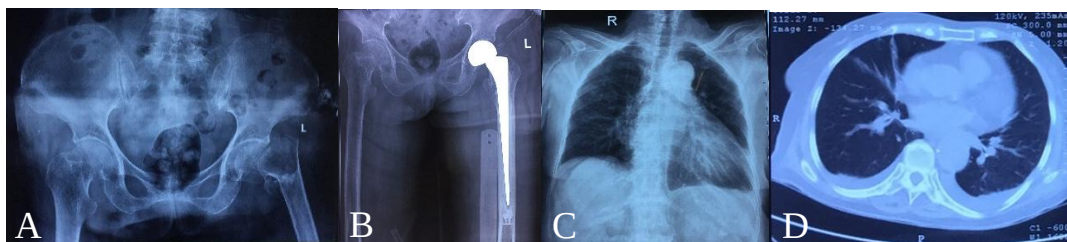


Figure 2. Patient Ly Thi T.

A: Preoperative anteroposterior pelvic radiograph; B: Postoperative anteroposterior pelvic radiograph; C: Posteroanterior chest radiograph demonstrating features of pneumonia; D: Chest CT scan demonstrating bilateral pneumonia and pleural effusion

DISCUSSION

For the first year after hip fracture, the effects on mobility and mortality in older patients are well established. Only a few studies have analyzed the long-term impacts. This study found that hip fractures in the elderly reduced functional outcomes and were associated with high mortality rates at the 5-year follow-up.

In our study, there were 38 patients (95%) who survived at 1 year postoperatively with a mean BI of 90.66 ± 14.76 . At 5-year follow-up, there were only 28 patients (70%) surviving with a mean BI of 88.39 ± 16.83 . At 1 year and 5 years after surgery, 23/38 (60.53%) patients and 12/28 (42.86%) patients, respectively, were able to walk without the use of walking aids. 11/38 (28.95%) patients at 1 year and 13/28 (46.43%) patients at 5 years after surgery were able to walk with a stick or frame. Especially, we found that 3/38 (7.89%) patients at 1 year and 1/28 (3.57%) patients at 5 years had only mobility with a wheelchair. According to Tom K et al., the highest post-fracture BI score (86 points; 95%CI: 82 - 89) was 6 months later. These findings suggested that the most promising period for rehabilitation following hip surgery is the first 6 months. The average BI score decreased after 6 months and during further survey periods (12 months: 85 points, 95%CI: 81 - 90; 5 years: 76 points, 95%CI: 71 - 81). The loss of BI score may

have been caused by additional comorbidities in elderly patients [6]. The differences between their results and ours might be due to the different research populations. According to some studies, 1 - 5 years following surgery, a much smaller percentage of older patients were able to walk independently. At a 4.9-year follow-up, Kammerlander et al. found that only 8% of the survivors could walk without the use of walking aids [7]. Because of aging patients' growing frailty, other authors have already identified aging and poor mental health as risk factors for worse functional outcomes, particularly in a long-term follow-up study.

25% (10/40) of the patients in this research experienced complications, including pneumonia, delirium, superficial wound infections, deep surgical site infections, and stroke (*Table 3*). During the follow-up, 60% (6/10) of them died. Reoperations were carried out within the first month following the initial operation due to wound infection. In 2018, Tiihonen et al. reported that 16.3% (80/490) of patients experienced complications following surgery for hip fracture. During the follow-up, 87.5% (70/80) of the patients with complications needed reoperation, and the most common complication was a mechanical failure of the prosthesis; however, the most common complication leading to reoperation was a dislocation. Of all reoperations, 34.2% were carried out

during the first month and 72.9% within 1 year following initial operation [8]. According to a study conducted in Finland, 9% of the patients required one or more additional procedures because of a problem with the primary operation. 65% of the first reoperations were carried out during the first year after treating the acute hip fracture. Additionally, the study demonstrated that reoperations for a hip fracture are linked to a higher mortality rate [4].

The mortality rates in our study at all follow-up time points were lower than those in many studies. According to Knauf et al. (2019), 6.3% of patients died during hospitalization, 34.7% died within the first year, and 68% died within 5 years after surgery. The explanation for the higher mortality in Knauf's study compared to our study was that the preoperative patients' status in their study was more severe than in our study. Our study has shown that the mortality rate in men is higher than in women (50% vs. 23.33%). In Knauf's study, the mortality rate of males and females was 73% and 57%, respectively [6]. In another study, at 10-year follow-up, the mortality rate was 82% for females and 75% for males [8]. In our study, the mortality rate of the group of 80 - 89 years was highest (36.36%). Research by Nasab et al. showed that the mortality rate increases with age. The group of 80 - 89-year olds had the highest mortality rate (63.01%), the

group of 60 - 69 year olds had the lowest mortality rate (4.67%) [9]. We also demonstrated that the incidence of perioperative complications had a significant influence on the long-term survival of the patients ($p = 0.011$). Several studies also reported that excess mortality after hip fracture may be connected to complications following surgery [10]. Thus, prevention of postoperative complications and provision of the best specialized medical care when these issues arise are crucial for lowering mortality.

CONCLUSION

Patients ≥ 70 years of age with intertrochanteric fractures who underwent hemiarthroplasty surgery had a BI score of 88.39 ± 16.83 at 5 years postoperatively, and a 5-year mortality rate of 30%. The 5-year mortality rate was related to postoperative complications.

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