CEMENTLESS BIPOLAR LONG STEM HEMIARTHROPLASTY FOR INTERTROCHANTERIC FRACTURES IN ELDERLY PATIENTS AT CAN THO CENTRAL GENERAL HOSPITAL

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ABSTRACT

Objective: To evaluate the outcomes of cementless bipolar long stem hemiarthroplasty for the treatment of intertrochanteric fractures in elderly patients at Can Tho Central General Hospital. **Subjects and Methods:** A prospective, cross-sectional study was conducted on 41 patients, aged 60 years or older, who underwent surgical treatment for intertrochanteric fractures at the Center for Trauma and Orthopedics of Can Tho Central General Hospital, between May 2022 and June 2024. **Results:** The average age of patients was 80.27 ± 8.385 years, with 87.7% being female. Domestic accidents were the cause of fractures in 97.6% of cases. Diabetes was present in 87.8% of patients, and 63.42% had A2.3 grade intertrochanteric fractures. After surgery, 90.2% of patients experienced limb shortening of less than 1 cm. The average VAS (Visual Analog Scale) score significantly decreased post-surgery ($p < 0.001$). Hip function assessment showed "very good" and "good" outcomes in 60.97%, 92.68%, and 95.12% of patients at 1 month, 1 year, and 2 years postoperatively, respectively. Three patients experienced postoperative complications. **Conclusion:** Cementless bipolar long stem hemiarthroplasty is an effective treatment for intertrochanteric hip fractures in elderly patients, providing favorable outcomes with minimal complications.

Keywords: *Intertrochanteric fracture, cementless bipolar long stem hemiarthroplasty, elderly patients.*

I. INTRODUCTION

Intertrochanteric fracture of the femur is an extracapsular fracture with the fracture line extending from the base of the femoral neck to the lower edge of the lesser trochanter. It is quite common, accounting for 55% of proximal femoral fractures and 95% of similar fractures in the elderly. Women are 2-3 times more likely than men to experience this type of fracture, with the primary cause being osteoporosis, often triggered by a fall onto the buttocks or thigh on a hard surface [1].

Currently, there are various treatment methods for intertrochanteric fracture, including conservative management, bone fusion, and hip hemiarthroplasty. Each method has its own advantages, disadvantages, and specific indications. Surgical treatment is now considered the primary approach, as it helps reduce pain, allows for early mobilization, prevents complications associated with prolonged immobility, and facilitates quicker return to daily activities. In elderly patients, surgical treatment through internal fixation has a high failure rate and several complications due to

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poor bone quality and multiple underlying conditions [2].

Compared to internal fixation, hip hemiarthroplasty offers earlier mobilization, shorter operative times, and less vascular damage [3]. However, hip hemiarthroplasty has certain drawbacks, including prolonged pain, risk of loosening prosthesis, and subtrochanteric fractures. To optimize outcomes, the cementless long stem hip hemiarthroplasty technique has been developed. This technique combines hip hemiarthroplasty with an intramedullary nail to stabilize the distal femur, making it suitable for fractures with multiple fragments that cause instability of the trochanter and severe osteoporosis in elderly patients [4].

At the Center for Trauma and Orthopedics of Can Tho Central General Hospital, cementless long stem hip hemiarthroplasty has been used for several years to treat intertrochanteric fractures in elderly patients. To summarize and evaluate the effectiveness of this treatment and contribute to improving outcomes, we conducted a study to evaluate the results of cementless hip hemiarthroplasty for intertrochanteric fractures in elderly patients at Can Tho Central General Hospital.

II. SUBJECTS AND METHODS

2.1. Research Subjects

This study included 41 patients, aged 60 years or older, who underwent surgery for intertrochanteric fractures using cementless long stem hip hemiarthroplasty at the Center for Orthopedics and Traumatology of Can Tho Central General Hospital, from May 2022 to June 2024.

- Inclusion criteria: Patients aged 60 years or older, diagnosed with intertrochanteric fracture, and treated with cementless long stem hip hemiarthroplasty at Can Tho Central General Hospital during the study period.
- Exclusion criteria: Patients with pathological fractures, incomplete pre- or post-operative X-rays, refusing to participate in the study, or those with pre-existing hip or knee joint conditions that hinder walking.

2.2. Research Method

This is a prospective, descriptive study without a control group, using convenient sampling. Patients' data and research parameters were recorded based on a data collection form. Treatment outcomes were evaluated through clinical examination and X-ray imaging at the time of surgery and during follow-up.

2.3. Data Analysis and Processing

Data were analyzed using medical statistical algorithms with SPSS version 20.0.

2.4. Medical Ethics

Ethical approval for the study was obtained from the Research Ethics Committee of Can Tho Central General Hospital. Patients who voluntarily participated in the study were thoroughly informed about the purpose, procedures, and content of the research, as well as potential benefits, risks, and responsibilities. Contributions to scientific knowledge and the treatment method were also discussed. All patient-related information was kept confidential and used solely for research purposes.

III. RESULTS

Table 1. ***General characteristics of study subjects***

Characteristics (n=41)	Values
Age ($\bar{X}$ ± SD)	80,27 ± 8,39 (64 - 97)
Gender, n (%) **+ Male** **+ Female**	 5 (12,2%) 36 (87,7%)
Causes of fractures, n (%) **+ Domestic accidents** **+ Traffic accidents**	 40 (97,6%) 1 (2,4%)
Comorbidities, n (%) **+ Hypertension** **+ Diabetes** **+ Respiratory diseases** **+ Others**	 15 (36,6%) 36 (87,8%) 31 (75,6%) 11 (26,8%)
Fracture grades, n (%): **+ 31-A2.2** **+ 31-A2.3**	 15 (36,6%) 26 (63,4%)
Operation time (minutes) ($\bar{X}$ ± SD)	102,93 ± 29,43 (range: 60 - 215)
Amount of transfused red blood cells, n (%) **+ 50ml** **+ 350ml**	 16 (39,0%) 25 (61,0%)
Hospital stay (days) ($\bar{X}$ ± SD) **+ Total hospital stay** **+ Postoperative hospital stay**	 12,39 ± 2,62 (range: 9 – 20) 6,17 ± 1,55 (range: 3 - 9)
Degrees of osteoporosis, n (%): **+ Grade II** **+ Grade III** **+ Grade IV**	 9 (22,0%) 20 (48,8%) 12 (29,3%)

Comments: This study involved 41 patients with a average age of 80.27 ± 8.39 years. Of these, 87.7% were female, 97.6% had domestic accidents, 87.8% had diabetes and 63.42% had A2.3 intertrochanteric fractures. The average surgery time was 102.93 ± 29.43 minutes. All patients received blood transfusions during or after surgery, with an average hospital stay of 12.39 ± 2.62 days. Osteoporosis grade III or higher was present in 78.0% of patients.

Table 2. ***Changes in VAS and Hemoglobin scores before surgery and at discharge***

Characteristics ($\bar{X}$ ± SD)	Before surgery	After surgery	p (Paired samples Test)
VAS	5.27 ± 1.03	2.17 ± 0.71	< 0.001
Hemoglobin (g/dL)	10.91 ± 1.45	10.09 ± 1.20	0.099

Comments: The average total VAS score significantly decreased post-surgery ($p < 0.001$), indicating effective pain relief. Hemoglobin levels decreased slightly after surgery, but the change was not statistically significant ($p = 0.099$).

Table 3. ***Characteristics of limb shortening before and after surgery***

Limb Shortening	< 1cm	1-2 cm	> 2cm
Before surgery	24 (58.5%)	16 (39%)	1 (2.4%)
After surgery	37 (90.2%)	4 (9.8%)	0 (0%)

Comments: Before surgery, 58.5% of patients had limb shortening of less than 1 cm. Postoperatively, this increased to 90.2%, and there were no cases with limb shortening greater than 2 cm.

Table 4. ***Overall treatment results according to the Harris scale***

Overall Results	1 month	1 year	2 years
Very good (90-100 points)	22.0%	39.0%	58.5%
Good (80-89 points)	39.0%	53.7%	36.6 %
Average (70-79 points)	26.8%	4.9%	2.4%
Poor (< 70 points)	12.2%	2.4%	2.4%

Comments: The overall treatment results were "very good" and "good", with rates of 61.0%, 92.7%, and 95.1% after 1 month, 1 year, and 2 years, respectively.

Table 5. ***Postoperative outcomes***

Outcomes	Number (n)	Percentage (%)
Complications		
Incisional bleeding	2	4,9
Pressure ulcers	1	2,4
Others (e.g., death, loose stem, deep vein thrombosis)	0	0
Good wound healing	38	92,7

Comments: Postoperative complications included 4.9% (2 patients) with wound bleeding on day 1 and 2.4% (1 patient) with pressure ulcers. Otherwise, 92.7% of patients had good wound healing.

IV. DISCUSSION

Age: This study recorded an average patient age of 80.27 ± 8.385 years, with the youngest being 64 years old and the oldest 97 years old. This is statistically similar to Cao Tan Sau's findings of 79.48 ± 6.2 years (p = 0.551) [5], but statistically younger than Hoang The Hung's cohort, which had a mean of 86.39 ± 3.7 years (p < 0.001) [6], and Nguyen Van Viet's patients, who aged 86.25 ± 6.39 years (p < 0.001) [7]. Other studies also show higher mean of patient age, such as Pham Tuan Khanh's cohort with 84.07 ± 7.93 years (p = 0.006) [8], Vu Truong Thinh's cohort with 83.9 ± 6.5 years (p = 0.008) [9], Nguyen Ngoc Son's cohort with 84.03 ± 5.88 years (p = 0.006) [10], and Phan Van Ngoc's cohort with 86.1 ± 11.9 years (p < 0.001) [11]. This difference between studies could be explained by differences in study selection criteria. For instances, Hoang The Hung [6] selected patients aged ≥ 80; otherwise, Nguyen Van Viet [7], Nguyen Ngoc Son [10], and Phan Van Ngoc [11] studied patients aged ≥ 70.

Gender: This study found that most patients were female (87.7%). Similar findings were reported by other authors: Hoang The Hung recorded 68.1% female patients [6], Nguyen Van Viet found a female-to-male ratio of 2:1 [7], Vu Truong Thinh found a ratio of 4:1 [9], Nguyen Ngoc Son found a ratio of 2.44:1 [10], Phan Van Ngoc recorded 67.6% female patients[11], and Cao Tan Sau noted a female-to-male ratio of 4:1 [5]. The higher prevalence of intertrochanteric fractures in women is primarily due to osteoporosis, which is more common and severe in postmenopausal women due to hormonal changes and childbirth effects. According to the World Health Organization, individuals over 70 years old experience significant changes in bone density and other anthropometric factors, making the femur's trochanteric

region more prone to fractures from minor trauma.

Cause: This study found that 97.6% of fractures were caused by domestic accidents with a rate 40 times being higher than that of traffic accidents (2.4%). Similar results were reported by Vu Truong Thinh (91.4% domestic accidents) [9], Nguyen Ngoc Son (93.5%) [10], Phan Van Ngoc (86.2%) [11], and Cao Tan Sau (97.5%) [5].

Comorbidities: This study recorded type 2 diabetes in 87.8% of patients and hypertension in 36.6%. Other studies have also identified hypertension and diabetes as common comorbidities: Hoang The Hung recorded 41.7% of patients with hypertension and 12.5% with diabetes [6], Nguyen Van Viet found 44.9% with cardiovascular disease and 23.2% with diabetes [7], and Cao Tan Sau reported 75% with cardiovascular disease and 85% with diabetes [5].

Fracture grades: According to the AO classification, 63.4% of patients had A2.3 fractures, and 36.6% had A2.2 fractures. Other studies reported different proportions: Hoang The Hung recorded a higher proportion of A2.2 fractures (83.3%) [6], while Nguyen Ngoc Son found 51.6% A2.2 fractures [10]. On the other hand, Nguyen Van Viet recorded 61.2% A2.3 fractures [7], Vu Truong Thinh found 60% [9], and Cao Tan Sau also reported 60% A2.3 fractures [5].

Surgery time: The average surgery time was 102.93 ± 29.43 minutes, ranging from 60 to 215 minutes. This was significantly longer than Hoang The Hung's findings of 61 ± 21.7 minutes ($p < 0.001$), which ranged from 45 to 130 minutes [6].

Postoperative hospital stay: The average postoperative hospital stay was 6.17 ± 1.55 days, ranging from 3 to 9 days. This was shorter than the 10.9 ± 5.9 days reported by Hoang The Hung ($p < 0.001$) [6], but was similar to Le Quang Vu who found an average of 6.7 ± 1.19 days [12].

Total hospital stay: The average total hospital stay was 12.39 ± 2.62 days, which was shorter than the 14.06 ± 2.24 days reported by Nguyen Ngoc Son ($p < 0.001$) [10].

Osteoporosis prevalence: This study recorded 48.8% of patients with grade III osteoporosis, 29.3% with grade IV, and 22% with grade II. Vu Truong Thinh found higher rates of grade IV osteoporosis (48.6%) and grade III (42.8%), with grade II only at 8.6% [9]. Conversely, Pham Tuan Khanh recorded a higher percentage of grade II osteoporosis (60.8%), followed by grade III (39.2%) [8].

VAS score: This study recorded an average preoperative VAS (Visual Analog Scale) score of 5.27 ± 1.03, which significantly decreased to 2.17 ± 0.71 postoperatively ($p < 0.001$), indicating a substantial reduction in pain. Similarly, Pham Tuan Khanh reported a preoperative VAS score of 7.37 ± 1.17, which dropped to 3.6 ± 1.06 post-surgery, showing significant pain improvement at 1, 3, and 6 months postoperatively [8]. Cao Tan Sau noted that post-surgical pain severity according to the VAS scale was 22.5% severe, 72.5% moderate, and 5% mild, with significant improvement after surgery [5].

Hemoglobin (g/dL): This study recorded an average hemoglobin level of 10.91 ± 1.45 g/dL pre-surgery, which slightly decreased to 10.09 ± 1.20 g/dL post-surgery. This reduction was not statistically significant ($p = 0.099$). An explanation for this result is that 100% of the patients received blood transfusions during and after surgery, with 61% receiving packed red blood cell transfusions from 350 ml of whole blood, and 39% receiving 250 ml transfusions.

Limb shortening: Before surgery, 58.5% of patients had limb shortening of less than 1 cm. After surgery, this increased to 90.2%, and no cases of limb shortening greater than 2 cm were recorded.

General results: This study showed that the overall treatment outcomes rated "very good" and "good" after 1 month, 1 year, and 2 years were 61%, 92.7%, and 95.1%, respectively. The proportion with "very good" outcome increased over time, while the rates of average and poor outcomes decreased. In comparison, Le Quang Vu reported postoperative outcomes as 24.3% very good, 40.5% good, 21.6% average, and 13.5% poor [12]. Vu Truong Thinh recorded 45.7% very good, 37.1% good, 8.6% average, and 8.6% poor [9]. Nguyen Van Viet found 78.4% of patients had very good or good outcomes after 1 year of follow-up, with 13.5% rated as average and 8.1% poor [7]. Pham Tuan Khanh reported that 1 month after surgery, 17.9% of patients had good outcomes, 60.7% had fair, and 21.4% had poor outcomes. At 3 months, 35.7% had good or very good outcomes, 46.4% had fair outcomes, and 17.9% had poor outcomes. By 6 months, 60.8% had good or very good outcomes, 28.6% had fair outcomes, and 10.6% had poor outcomes [8]. Hoang The Hung reported that 88% of patients were able to recover functional capacity for daily activities [6].

Complications: This study recorded a 4.9% rate of postoperative wound bleeding (2 patients) on day 1 and a 2.4% rate of pressure ulcers (1 patient). These rates are lower than those reported by Hoang The Hung, who found a 22.2% complication rate, including pneumonia, acute renal failure, pulmonary thrombosis, surgical site infection, mental disorders, and sepsis [6]. Le Quang Vu reported a 5.4% complication rate, with pneumonia and cerebrovascular accidents each accounting for 2.7% [12]. Nguyen Van Kiet reported complications including pneumonia (8.7%), urinary tract infections (7.3%), venous thrombosis (1.4%), pressure ulcers (1.4%), and superficial surgical site infections (1.4%) [7]. Vu Truong Thinh found a 2.9% rate for fracture complications, infectious complications, and cerebrovascular accidents each [9]. Cao Tan Sau reported early complications in 17.5% of patients and late complications in 20% [5]. The lower complication rate in our study may be due to the comprehensive preoperative cardiovascular evaluations, blood management during and after surgery, and early physical therapy, both passive and active, conducted by a rehabilitation team.

V. CONCLUSION

Our study found that the average patient age with intertrochanteric fractures was 80.27 ± 8.39 years, with 87.7% of the patients being female, and 97.6% of the cases resulting from domestic accidents. A2.3 intertrochanteric fractures accounted for 63.4% of all cases. The average VAS score significantly decreased post-surgery, demonstrating effective pain management. Treatment outcomes were rated as very good or good at 1 month, 1 year, and 2 years post-surgery, with success rates of 61%, 92.7%, and 95.1%, respectively. Cementless long stem hip hemiarthroplasty proved to be a safe and effective treatment for elderly patients with intertrochanteric fractures.

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