EVALUATION OF SURGICAL TREATMENT RESULTS FOR FRACTURES IN THE TROCHANTERIC AREA USING LOCKING PLATES AT HA DONG GENERAL HOSPITAL

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Abstract

Objectives: To evaluate the results of surgery to treat adult fractures in the trochanteric area using locking plates at Ha Dong General Hospital. ***Methods:*** A retrospective, cross-sectional descriptive study on 30 patients with fractures in the trochanteric area who underwent surgery with locking plates, followed up, and re-examined at Ha Dong General Hospital from January 2018 to February 2022. ***Results:*** The main cause of injury was daily life accidents (63.3%). Classification according to AO: Type A1 fractures accounted for 13.3%, type A2 fractures were 56.7%, and type A3 fractures were 30%. The average hospital stay was 12.3 days. The anatomical correction results were 90% good and 10% not good. Bone healing results: Good bone healing was 96.7%; poor bone healing was 3.3%, with no cases of osteoarthritis or pseudoarthritis. The results of good and very good walking function were 86.7%, and poor walking function was 3.3%. Overall results: Very good and good accounted for 86.7%, average was 10%, and poor results was 3.3%. ***Conclusion:*** Fractures in the femoral trochanter area are mainly caused by daily life accidents. Bone union with locking plates is a good treatment method for patients with fractures in the trochanteric area helping to firmly fix fractures, allowing patients to exercise and practice early rehabilitation. It is convenient for patients to return to daily life, reducing the rate of complications encountered, thereby improving the quality of life for patients and reducing the burden on families and society.

Keywords: Locking plate; Trochanter facture; Adult.

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INTRODUCTION

A fracture in the femoral trochanter area is an extra-articular fracture in the transition area between the femoral neck and the femoral shaft. The fracture line is located in the area connecting the greater trochanter to 5cm below the lesser trochanter. Fractures in the femoral trochanter area are quite common, accounting for 55% of upper femoral head fractures, occurring in all ages but are more common in elderly and female patients. Common causes are traffic and work accidents, but the most common are daily life accidents.

In 1935, Boehler proposed that the main treatment method for femoral trochanteric fractures is continuous traction [1]. But after a while, people noticed many complications such as joint stiffness, spleen ulcers, pneumonia due to prolonged lying down, etc., especially, the high death rate.

Due to the development of minimally invasive surgery methods, intramedullary fixation has been recently used to treat femoral intertrochanteric fractures. On the other hand, proximal femoral deformity in adults can be induced by a wide variety of primary diseases, including poliomyelitis sequela, proximal femoral fibrous dysplasia, malunion after fracture, internal fixation implant failure, and the residual deformities from previous osteotomy, which may cause unpredictable pathological and biomechanical changes of the proximal femur and femoral osteotomy. Therefore, total hip arthroplasty for femoral reconstruction and fixation are conventional treatment options for patients without proximal femoral fractures. However, when intertrochanteric fracture and proximal femoral deformity are presented simultaneously, due to the unpredictable fracture pattern, complex proximal femoral geometry and deformity morphology, more accurate clinical decision-making, higher technical requirements for fracture reduction, and a more sophisticated postoperative rehabilitation experience are essential prerequisites for excellent and good clinical outcomes of the patients and is a substantial challenge for intramedullary fixation or total hip arthroplasty and osteotomy for the treatment of femoral intertrochanteric fractures in patients with pre-existing proximal femoral deformities. Orthopedic surgeons are faced with the dilemma of performing a simple and effective internal fixation procedure on these patients to restore optimal hip function. Locking plates have the advantage of firmly fixing the fracture in cases where the patient's bone density is poor

because the thread system on the screw cap is fixed into the locking hole without the need for pressure against the bone surface. Creating a fixed angle with the screw makes the locking plate have the same working principle as an external fixation frame, but is much more stable with axial force and torsional force due to the distance between the brace and the bone is very small. When under pressure, all locking screws have equal and simultaneous effectiveness. This causes the plate structure - the bone to bear the load evenly, avoiding over-loading and reducing the risk of plate fatigue.

Therefore, to clarify the advantages and disadvantages of the locking plate bone combination method, learn from experience, and improve the quality of treatment of trochanteric fractures, we conducted the research: *To evaluate surgical treatment results for fractures in the trochanteric area using locking plates at Ha Dong General Hospital.*

MATERIALS AND METHODS

1. Subjects

30 patients with femoral trochanteric fractures who underwent surgery were enrolled in the study, all these patients underwent osteosynthesis with proximal femoral locking plates at Ha Dong General Hospital from January 2018 to February 2022.

* *Inclusion criteria:* Patients ≥ 16 years old; patients with femoral trochanteric fractures were treated with surgery using locking plates; patients have complete clinical and subclinical information; patients agreed to participate in the study.

* *Exclusion criteria:* Cases of fracture in the femoral trochanter area due to pathology; patients < 16 years old; patients who are paralyzed and unable to walk before surgery; cases of medical record information are incomplete.

2. Methods

* *Research design:* A retrospective, cross-sectional descriptive study was conducted.

* *Definition of variables:* Data on age, sex, and causes of accidents; classification of intertrochanteric fracture according to AO; the total amount of blood transfused before, during, and 48 hours after surgery; the femoral neck angle after surgery, classification of Baumgaertner MR [2], and complications were recorded for each patient.

* *Evaluation methods:*

- Based on subclinical:

+ The femoral neck angle after surgery: Measured on routine pelvic X-rays taken immediately after surgery.

Assessed by measuring the femoral neck angle on the healthy side, the femoral neck angle on the broken side before surgery, immediately after surgery, and when the bone heals. The femoral neck angle is classified according to value groups: 125 - 135 degrees; 120 - < 125 degrees; and < 120 degrees. If the femoral neck angle after surgery reaches a value of 125 - 135 degrees, it is considered good.

+ Time over 6 months since surgery. Evaluate the results of anatomical recovery correction after surgery based on conventional radiographs of the pelvis; based on the classification of Baumgaertner MR [2], divided into 3 levels: Good (the anatomical correction is normal or slightly abducted, anteroposterior flexion displacement is no more than 20 degrees, the fracture gap is no more than 4mm); average (one of the standards is not met at a good level); bad (correction does not meet any standards).

+ The primary postoperative assessment was evidence of osseous consolidation on plain anteroposterior and lateral radiographs. Union was considered present if there was osseous continuity between the greater trochanter and the femur and if there was no evidence of trochanteric migration or broken hardware.

+ All radiographs were reviewed by both authors, and consensus was reached for each patient.

- Based on clinical:

+ Skills and ability to self-solve daily tasks such as living and working activities.

+ Joint range of motion based on Harris hip score [3]. With this tool, functional status can be categorized as excellent (90 - 100 points), good (80 - 89 points), fair (70 - 79 points), or poor (< 70 points). Physical exam was assessed for range of motion, presence of limp, hip abduction strength (tested standing and manually in the lateral decubitus position), and presence of trochanteric pain or crepitation on palpation.

* *Statistical analysis:* Data were processed according to medical statistical methods using SPSS 22.0 software.

3. Ethics

Subjects all agreed and voluntarily participated in the research, with a clear explanation of the purpose of the research to improve the quality of diagnosis and treatment. Information about research subjects is respected and kept confidential.

RESULTS AND DISCUSSION

Table 1. Age and gender distribution (n = 30).

Age	Gender		Total (n)	Ratio (%)
	Male	Female		
16 - 45	2	1	3	10
46 - 59	2	2	4	13.3
60 - 79	2	6	8	26.7
≥ 80	5	10	15	50
Total	11	19	30	100
Ratio (%)	36.7	63.3	100	100

The largest age group was ≥ 80 years old, accounting for 50% of patients. The youngest age was 38 , and the oldest was 98. The average age was 69.6.

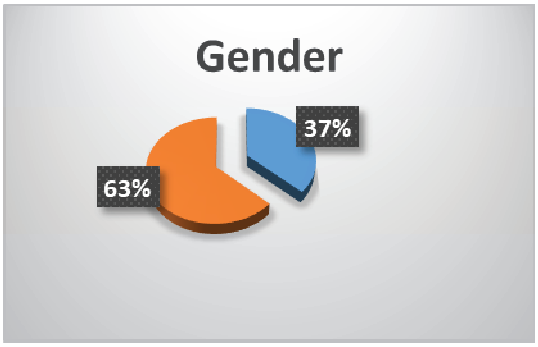

Figure 1. Distribution of patients by gender (n = 30).

Female patients with femoral trochanteric area fractures accounted for 63.3% while male patients accounted for 36.7%.

In most studies, the proportion of female patients with trochanteric area fractures is higher than that of male patients. In our research group, there were 19 female and 11 male patients, and the male-to-female ratio was 1:1.72.

As the age increases, there are more female patients with femoral trochanteric area fracture than male patients. Perhaps because osteoporosis in elderly females is more severe than in males, bone fractures are more common. This result is similar to the study of Le Tat Thang (2023) 1:2.4. [4]

Table 2. Causes of accidents.

Causes	Labor accidents	Traffic accidents	Living accidents	Total
Number (n)	4	7	19	30
Ratio (%)	13.3	23.4	63.3	100

Traffic accidents and work accidents were the main causes of femoral trochanteric area fractures in people whose ages < 60, while daily life accidents were the main cause of trochanteric area fractures in people > 60 years old.

The majority was daily life accidents (19/43 patients, accounting for 63.3%). The most common mechanism of injury is falling and hitting the buttocks on a hard floor (floor, yard, toilet, etc.). Traffic accidents had only 7 cases (23.4%), and work accidents had 4 cases (13.3%) patients of working age.

Nguyen Tien Binh et al. (2002) studied 52 patients, all of whom had femur fractures due to daily life accidents (100%) [5]. In the research by Le Quang Tri, the main cause is also daily life accidents with a rate of 73.2% [6].

The results reflect reality because the elderly (> 60 years old) have thin bones in old age, and even a slight trauma can cause bone fractures. The femoral trochanter is a spongy bone area where bone shape changes, so when osteoporosis occurs, this is a weak spot that can easily cause fractures.

Table 3. Classification of lesions according to AO (n = 30).

Classification	A_1			A_2			A_3			Total
	$A_{1.1}$	$A_{1.2}$	$A_{1.3}$	$A_{2.1}$	$A_{2.2}$	$A_{2.3}$	$A_{3.1}$	$A_{3.2}$	$A_{3.3}$	
Number (n)	0	1	3	3	7	7	2	2	5	30
Ratio (%)		13.3			56.7			30		100

According to AO grading, grade A2 fractures accounted for the highest rate of 55.7%, grade A3 accounted for 30%, and grade A1 accounted for 13.3%.

Table 4. Blood transfusion before, during and 48 hours after surgery (n = 30).

Blood transfusion	0mL	250mL	500mL	750mL	Total
Number (n)	1	13	15	1	30
Ratio (%)	3.3	43.4	50	3.3	100

The proportion of patients requiring blood transfusion before, during, and 48 hours after surgery was 96.7%. The structure of the femoral trochanter area was mainly spongy bone, with rich blood vessels. When a bone fractures in this area, the patient often loses a significant amount of blood in addition to the amount of blood lost during surgery. Therefore, the issue of blood transfusion during and after surgery needs to be raised. However, the amount of blood needed for transfusion is different depending on each case, depending on the type of fracture, early or late surgery, ability to correct, surgery time, etc.

Table 5. The relationship between fracture classification and fracture reduction (n = 30).

Adjust	Classification fracture									Total
	A_{11}	A_{12}	A_{13}	A_{21}	A_{22}	A_{23}	A_{31}	A_{32}	A_{33}	
Good	0	1	3	3	7	6	2	1	4	27
Not good	0	0	0	0	0	1	0	1	1	3
Total	0	1	3	3	7	7	2	2	5	30

Most cases of fracture correction achieve good results, the neck and body angle reach 125 - 130 degrees, accounting for 90%, not good only accounted for 10%.

Table 6. Results of hip joint range of motion (n = 30).

Range motion	Normal	Decrease 10 - 30%	Decrease > 30 - 50%	Decrease > 50%	Total
Number (n)	15	10	3	2	30
Ratio (%)	50	33.3	10	6.7	100

The good range of hip movement after surgery was 50%, the range of hip movement reduced by 10 - 30% was 33.3%, and over 30% was 16.7%. Early treatment is a decisive factor in the ability to restore hip mobility function.

However, this depends heavily on the patient's efforts and the support of family members, so the results are not always as desired.

Table 7. Results of walking function (n = 30).

Function	Very good	Good	Medium	Bad	Total
Number (n)	15	11	3	1	30
Ratio (%)	50	36.7	10	3.3	100

Checking the clinical results, 26/30 patients (86.7%) can walk normally and very well; 3/30 patients (10%) limped, had pain when exerting themselves, and had to use crutches for support; 1 patient (3.3%) had frequent pain and could not walk. Cases of severe, continuous pain are among patients of older age, pre-existing osteoarthritis, and difficulty exercising.

Table 8. Results of a bone union based on X-ray (n).

Bone union	Good	Bad	Septic non-union	Pseudo-arthrosis	Necrosis of the femoral head	Total
Number (n)	29	1	0	0	0	30
Ratio (%)	96.7	3.3	0	0	0	100

In our study, 29/30 patients (96.7%) had good bone union. With complex fractures and elderly patients, the surgery cannot be prolonged for too long, so the problem of adjusting the axis is difficult and it is difficult to achieve the anatomical position. In our opinion, the priority is that the bones remain firm so that the patient can sit up early, avoid complications due to prolonged lying down, and create favorable conditions for the patient.

Table 9. Classification of clinical and radiological results (n).

Classification	Very good	Good	Average	Poor	Total
Number (n)	15	11	3	1	30
Ratio (%)	50	36.7	10	3.3	100

The number of patients with very good and good results accounted for 86.7%, significantly higher than the number of patients with average results of 10% and patients with poor recovery of 3.3%.

Some research projects on the treatment of femoral trochanteric area fractures by other authors have shown the following results:

Dinh The Hai (2016) treated 29 elderly patients with femoral trochanteric area fractures using the locking plate [7], with the following Nguyen Trung Sinh results [8]: Very good: 24.1%; good: 51.7%; average: 20.7%; poor: 3.5%.

Compared with the results of previous studies, it was found that the results obtained in the treatment of intertrochanteric femoral area fractures with locking plates at Ha Dong General Hospital were quite good results.

CONCLUSION

In the study, among 30 patients with femoral trochanteric fractures using a locking plate at Ha Dong General Hospital from January 2018 to February 2022, we found general results according to Nguyen Trung Sinh's standards [8]: Very good: 50%; good: 36.7%; average: 10%; poor: 3.3%.

This treatment method firmly immobilizes the fracture, allowing the patient to mobilize and practice early rehabilitation. It is convenient for patients to return to daily life, reducing the rate of complications encountered. Thus, it improves the quality of life for patients and reduces the burden on families and society.

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