

# Comparative Study on the Treatment Efficacy of Direct Anterior Approach and Direct Lateral Approach for Irreducible Intertrochanteric Fractures in the Elderly

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**Abstract:** *Purpose:* To explore the clinical effects of the direct anterior approach (DAA) and the direct lateral approach in elderly patients with irreducible intertrochanteric fractures. *Methods:* A retrospective analysis method was used to collect samples of 18 elderly patients with irreducible intertrochanteric fractures of the femur admitted to our hospital from January 2020 to January 2023, and they were divided into a study group (n = 9) and a control group (n = 9) according to different surgical plans. Both groups of patients underwent internal fixation with proximal femoral nail anti-rotation (PFNA). The patients in the control group were treated through the direct lateral approach, and those in the study group were treated using DAA. The surgical conditions, recovery conditions, and indicators of postoperative complications were compared between the two groups. *Results:* The operation time and intraoperative blood loss of the study group were lower than that of the control group ( $P < 0.05$ ); there was no significant difference in the degree of hip flexion and extension recovery between the two groups after surgery, as well as the functional scores ( $P > 0.05$ ); the study group had a lower incidence of complication than the control group ( $P < 0.05$ ). *Conclusion:* Compared with the direct lateral approach, the DAA to the hip joint in elderly patients with irreducible intertrochanteric fractures can shorten the operation time, reduce intraoperative blood loss, and shorten the recovery period of joint function. With a satisfactory prognosis and low incidence of complications, it can be promoted and applied in medical institutions.

**Keywords:** Intertrochanteric fracture of femur; Direct anterior approach to hip joint; Direct lateral approach

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## 1. Introduction

Intertrochanteric fractures account for a high proportion of all types of orthopedic fractures. It involves the hip joint and surrounding tissues, commonly affecting the elderly. The main clinical symptoms are swelling in the fracture area, pain, limited activity, and deformity of the affected limb <sup>[1]</sup>. Proximal femoral nail anti-rotation (PFNA) internal fixation is the primary clinical treatment option for intertrochanteric fractures in the

elderly. It can fix the fracture end and promote the recovery of joint function. The therapeutic effect of PFNA internal fixation is related to the intraoperative exposure of the proximal femur and the fracture reduction effect. For this reason, an appropriate surgical approach should be selected [2]. Open treatment is usually required for irreducible intertrochanteric fractures since satisfactory reduction through closed traction cannot be achieved. The conventional direct lateral hip approach is widely used in clinical practice, but it exhibits drawbacks of excessive soft tissue dissection, poor exposure, and a high incidence of postoperative complications. The direct anterior approach (DAA) provides access to the hip through the natural gap of the human body, which can reduce surgical trauma and improve reduction and fixation effects [3,4]. This study selected 18 elderly patients with irreducible intertrochanteric fractures to compare and analyze the clinical effects of the direct anterior approach and the direct lateral approach.

## 2. Materials and methods

### 2.1. General information

This study conducted a retrospective analysis on 18 elderly patients with irreducible intertrochanteric fractures treated in the hospital from January 2020 to January 2023, and they were divided into a study group ( $n = 9$ ) and a control group ( $n = 9$ ) based on different surgical plans. There were 7 males and 2 females in the study group, with an age range of 65–79 years old and an average age of  $72.68 \pm 3.59$  years. There were 6 males and 3 females in the control group, with an age range of 66–78 years old and an average age of  $72.62 \pm 3.64$  years. There was no significant difference in the general data of the two groups of patients ( $P > 0.05$ ).

Inclusion criteria included patients with irreducible intertrochanteric fractures clearly diagnosed through physical and imaging examinations, with no fractures or lesions in other parts; patients meeting the indications for PFNA internal fixation, and the basic physical condition can tolerate the surgery; patients who signed the research informed consent form.

Exclusion criteria were bilateral hip fracture; pathological fracture; combined with severe osteoporosis or history of fracture surgery.

### 2.2. Methods

Patients in both groups were treated through PFNA internal fixation. The patients were anesthetized after lying down on the operating table. The anesthesia plan selected was continuous epidural anesthesia, while some patients underwent general anesthesia. When the anesthesia was in effect, an indwelling traction bed was placed, with a soft pad under the hip joint, and the traction and reduction operation was performed on the fracture site to keep the patient in a comfortable supine position. The reduction was completed with closed reduction and PFNA internal fixation. If the reduction was unsuccessful, the lateral approach to the patient's hip joint was performed for patients in the control group. The vastus lateralis muscle was peeled off toward the rear to fully expose the trochanter and proximal end of the femur and the fracture end, the fracture was reduced and temporarily fixed. The guide pin was inserted through the greater trochanter of the femur at a fixed point. After the operation was completed, a C-arm machine inspection was performed. If the position of the guide pin is normal, the medullary reaming will be completed in a standardized manner and the PFNA main nail will be properly inserted. When placing the main screw, it was ensured that the extension line of the center point of the lag screw groove was above the longitudinal axis of the lower one-third of the femoral neck. After the operation, the position of the main screw was checked and the guide pin was removed. Under the guidance of the lateral aiming rod, the protective sleeve was accurately inserted, the spiral blade guide pin was inserted inside the femoral head and neck, and the position of the guide pin was checked with the C-arm machine (the

correct position is that the guide pin is at the middle and lower one-third area of the femoral head and neck as viewed from the anteroposterior), the lateral radiograph guide pin was in the middle of the femoral head and neck, and the distance between the guide pin and the lower part of the femoral head was about 5–10mm. A spiral blade was placed inside the femoral head neck, and the distance between its tail and the area below the femoral head was controlled to 5–10mm. The C-arm machine was utilized to fluoroscopically assess the effectiveness of the fracture fixation, the site was closed subsequently, and the locking nail and tail cap were installed. After the operation, the incision was sutured and a drainage tube was placed.

The patients in the study group adopted the DAA to the hip joint. The patients were anesthetized after lying down on the operating table. The anesthesia plan chosen was continuous epidural anesthesia, with some patients undergoing general anesthesia. After the anesthetic drugs were in effect, a traction bed was placed and soft padding was provided under the hip joint. A pad was used to perform a traction reduction operation on the fracture site to keep the patient in a comfortable supine position. The reduction was performed with closed reduction and PFNA internal fixation. If the reduction was unsuccessful, the DAA to the hip joint was performed for patients in the study group. Taking the anterior superior iliac spine as an anatomical landmark, starting from 2cm outside and 4–5cm below and extending distally, an incision about 6cm long was made, separating the sartorius muscle and tensor fascia lata, and entering along the Hueter interval, the ascending branch of the lateral circumflex femoral artery running between the two muscles needed to be carefully ligated during the operation. A Hohmann retractor was inserted and retracted laterally to fully expose the greater and lesser trochanters of the femur, the anterolateral bone surface of the proximal femur, and the intertrochanteric fracture area, the fracture end was reduced and temporarily fixed, and the reduction effect was checked. After completing the above operations, PFNA internal fixation was performed similarly to that of the control group. After the operation, the incision was sutured and a drainage tube was placed.

Within 48 hours after surgery, the drainage tubes were removed from both groups of patients, and antibiotics were administered to prevent infection. The affected limb was maintained in a neutral position with 30° abduction, and the patients were instructed to perform passive and active movements. Regular reviews were performed. The internal fixation could be removed 1 year after surgery.

### 2.3. Evaluation criteria

- (1) Various indicators of the surgical conditions and recovery conditions were compared between the two groups, including operation time, intraoperative blood loss, number of intraoperative fluoroscopy, postoperative drainage volume, postoperative weight-bearing time, and hospitalization time.
- (2) The hip joint function scores of the two groups of patients before surgery and 3 months after surgery were compared. The Harris Hip Score was used for the assessment, with a full score of 100. The higher the score, the better the hip joint function. The recovery degree of hip joint flexion and extension of the two groups of patients 3 months after surgery was compared, and the calculation formula was the joint flexion and extension of the affected side divided by the joint flexion and extension of the unaffected side.
- (3) The incidence of complications in the two groups of patients was observed and compared.

### 2.4. Statistical methods

SPSS23.0 software was used to analyze the research data. The measurement data, mean  $\pm$  standard deviation (SD), were used as *t* test, and the count data % were used as  $\chi^2$  test.  $P < 0.05$  indicated that there was a statistically significant difference.

### 3. Results

#### 3.1. Comparison of the surgical and postoperative recovery indicators between the two groups

The patients in the study group had shorter operation time and less intraoperative blood loss than those in the control group ( $P < 0.05$ ). There was no significant difference in postoperative drainage volume, postoperative weight-bearing time, and hospitalization time between the two groups ( $P > 0.05$ ). The details are shown in **Table 1**.

**Table 1.** Comparison of surgery and postoperative recovery indicators between the two groups (mean  $\pm$  SD)

Group	Operation time (minutes)	Intraoperative blood loss (ml)	Number of intraoperative fluoroscopy (times)	Postoperative drainage volume (ml)	Postoperative weight-bearing time (days)	Length of stay (days)
Study group (n = 9)	62.89 $\pm$ 5.72	368.48 $\pm$ 22.53	2.11 $\pm$ 0.42	164.25 $\pm$ 18.96	20.62 $\pm$ 2.47	13.28 $\pm$ 1.96
Control group (n = 9)	78.94 $\pm$ 7.25	409.84 $\pm$ 27.62	5.08 $\pm$ 0.95	164.29 $\pm$ 19.04	20.55 $\pm$ 2.39	13.31 $\pm$ 2.05
<i>t</i> value	5.214	3.481	8.578	0.004	0.061	0.032
<i>P</i> value	0.000	0.000	0.000	0.996	0.952	0.975

#### 3.2. Comparison of the hip joint function scores and hip flexion and extension recovery degrees between the two groups

There was no significant difference in hip joint function scores and hip flexion and extension recovery between the two groups after surgery ( $P > 0.05$ ), as shown in **Table 2**.

**Table 2.** Comparison of hip joint function scores and hip flexion and extension recovery degrees between the two groups (mean  $\pm$  SD)

Group	Hip joint function scores (points)		Hip flexion and extension recovery degrees
	Before surgery	After surgery	
Study group (n = 9)	18.22 $\pm$ 1.96	77.38 $\pm$ 5.69	86.24 $\pm$ 3.58
Control group (n = 9)	18.19 $\pm$ 2.04	77.42 $\pm$ 5.71	86.21 $\pm$ 3.64
<i>t</i> value	0.032	0.015	0.018
<i>P</i> value	0.975	0.988	0.986

#### 3.3. Comparison of the incidence of complications between the two groups

The study group has lower incidence of complications than the control group ( $P < 0.05$ ), as shown in **Table 3**.

**Table 3.** Comparison of complication rates between the two groups [n (%)]

Group	Incision infection	Malunion	Screw withdrawal or slippage	Complication rate
Study group (n = 9)	0	0	1	1 (11.1)
Control group (n = 9)	2	2	1	5 (55.6)
$\chi^2$ value				4.000
<i>P</i> value				0.045

## 4. Discussion

Intertrochanteric fracture is also called extracapsular fractures of the proximal femur, occurring in the area between the greater and lesser trochanters of the femur. The cause of the injury is mostly low-energy injuries such as falls. The primary symptoms include severe pain and swelling on the affected side, limb shortening or external rotation, limb movement limitation, etc.<sup>[5,6]</sup>. This type of fracture can be treated with conservative or surgical treatment. The main drawbacks of conservative treatment are extended bed rest and high incidence of complications and mortality. Therefore, surgical treatment is often used in clinical practice<sup>[7]</sup>.

PFNA internal fixation is a routine surgical treatment for intertrochanteric fractures. The key advantage is its firm and strong fixation, which facilitates early postoperative rehabilitation training and weight-bearing activities. In order to ensure the effect of PFNA internal fixation, it is necessary to fully expose the proximal femur and accurately reduce the fracture end<sup>[8]</sup>. Under the conventional direct lateral hip approach, the doctor performed the surgery through the lateral area of the femur. This approach has the disadvantages of large surgical incision, heavy trauma, damaged muscle tissue during the operation, and heavy bleeding. In addition, the vastus lateralis muscle is directly incised through the lateral area during the operation, which can lead to lateral femoral incision. There is tear damage to muscle fibers that in turn triggers scar healing in the incision area, affects soft tissue elasticity, and causes callus adhesion in the fracture area, which is not conducive to postoperative hip joint functional recovery<sup>[9]</sup>. Clinical studies have shown that during the surgical treatment of irreducible intertrochanteric fractures in the elderly, it is necessary to achieve anatomical reduction as much as possible on the basis of functional reduction, at the same time shorten the operation time in order to reduce surgical risks and enhance patient safety<sup>[10]</sup>. Under the DAA to the hip joint, the patient's anterior superior iliac spine area is selected as the starting point of the surgical incision. Through the natural gap between the sartorius muscle and tensor fascia lata, the fracture end can be fully exposed through the front side of the femur. This approach reduces damage to soft tissues and intraoperative blood loss significantly. Fracture reduction can be completed under direct vision, thereby ensuring the effects of reduction and fixation, and creating favorable conditions for early postoperative rehabilitation training. At the same time, the DAA to the hip joint is relatively safe without damaging the blood vessels and nerve tissue in the area surrounding the fracture, which can significantly reduce the incidence of postoperative complications<sup>[11]</sup>.

The results of this study confirmed that all indicators of the surgical and recovery conditions of the patients in the study group were lower than those in the control group, suggesting that the DAA to the hip joint can reduce the number of intraoperative fluoroscopy, shorten the operation time, and reduce surgical trauma. This may be due to that a longitudinal split on the vastus lateralis muscle fibers is performed under the direct lateral hip approach, which requires peeling of a large amount of soft tissue during the operation, thus affecting the blood supply status of the fracture area, and leading to prolonged postoperative recovery time and exposure of the fracture end during the operation. This approach is unsatisfactory as the screw placement operation is difficult, resulting in prolonged operation time, intraoperative blood loss, and increased number of fluoroscopy<sup>[12]</sup>. In the DAA to the hip joint, incision is made between the sartorius muscle and tensor fascia lata area without incision of muscle tissue, which can reduce the damage to the muscles, weaken the impact on the internal environment of the body, shorten the operation time, and reduce surgical trauma. This study shows that there is no significant difference in hip joint functional scores and hip flexion and extension recovery between the two groups of patients, suggesting that both the DAA and the conventional direct lateral approach can achieve good postoperative recovery results. This is because the DAA to the hip joint causes minor surgical trauma, less intraoperative blood loss, and firm hip joint fixation, which can shorten the patient's postoperative recovery time. The patient's compliance with early postoperative rehabilitation training is higher, which can improve the hip joint functional recovery<sup>[13]</sup>.

The results of this study showed that the incidence of complications in the study group was lower than that in the control group, suggesting that the DAA can reduce the incidence of postoperative complications. This may be attributed to the significant anatomical structural advantages of the DAA compared with the direct lateral approach. Fracture reduction is completed under direct vision, thereby achieving early stable fixation, shortening the patient's fracture healing time, and significantly reducing the incidence of screw withdrawal or slippage and malunion. The DAA to the hip joint results in minimal trauma, reduces soft tissue damage caused by surgical operations, shortens operation time, and helps reduce the incidence of infection<sup>[14,15]</sup>. This study indicates that the clinical effect of the DAA to the hip joint in elderly patients with irreducible intertrochanteric fractures is better than that of the direct lateral approach. However, the initial anatomy requirements of this surgery are higher, and it is necessary to accurately assess the patient's injury and complete the surgery in a standardized manner, assist patients to complete active and passive movements after surgery, and dynamically assess fracture recovery to enhance prognosis.

## 5. Conclusion

In summary, it can be seen from the results that compared with the direct lateral approach, the DAA can shorten the operation time and reduce surgical trauma in elderly patients with irreducible intertrochanteric fractures. The patient's postoperative recovery time is shorter, with positive effect of hip joint function recovery and low incidence of complications, thus it can be promoted and applied in medical institutions. The limitations of this study include relatively small sample size of elderly patients with intertrochanteric fractures, and no cross-sectional comparative study and analysis of the same type of data was conducted. In depth analysis of the advantages and disadvantages of using the DAA in elderly patients with intertrochanteric fractures is required.

## Disclosure statement

The authors declare no conflict of interest.

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