

# Analysis of the Effect of Dynamic Hip Screw and Anatomical Locking Plate in the Treatment of Elderly Patients with Intertrochanteric Fractures

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**ABSTRACT Objective:** To analyze the effects of dynamic hip screw (DHS) and anatomical locking plate in the treatment of intertrochanteric fractures in elderly patients. **Method:** 56 cases of intertrochanteric femur fracture from March 2012 to October 2014 were treated by surgical treatment. The cases were divided into A and B groups with A group treated with DHS and B group with anatomical locking plates. **Results:** Treatments of the two groups were successful. Operation time, bleeding volume, post-operative drainage, hospitalization time and fracture healing time of B group were significantly less than that of A group ( $p < 0.05$ ). The incidence of postoperative complications in B group was significantly less than that in the A group ( $p < 0.05$ ). The excellent and good ratings of B group was 93.1% and 66.7% for the A group. The fine rating of B group was higher than that of A group ( $p < 0.05$ ). **Conclusion:** Anatomical locking plate internal fixation for the treatment of intertrochanteric fractures in the elderly has certain advantages.

## KEYWORDS

DHS

Anatomic locking plate

Intertrochanteric fracture

## 1. Introduction

We used anatomical locking plates in the treatment of elderly patients with femoral intertrochanteric fractures from March 2012 to October 2014 and the effect was satisfactory. Dynamic hip screw (DHS) and anatomical locking plate treatments were compared.

## 2. Materials and methods

### 2.1. General information

Between March 2012 and October 2014, 56 cases of intertrochanteric femur fractures were treated by surgery. The cases were randomly divided into the DHS treatment group (A group) and anatomical locking plate treatment (B group). There were no significant differences in gender,

age, location, Evans-Jensen classification and the combination of and 29 cases in A group and two patients in B group ( $p > 0.05$ ).

### 2.2. Treatment method

#### 2.2.1. Pre-operative preparation

All patients were admitted into the hospital immediately after bone traction or skin traction, to maintaining limb flexion abduction. 30 routines of pre-operative medical examinations as well as treatment of patient's medical complications, use of subsidence for swelling, and dehydration drugs or antibiotics were given to prevent infection [1].

#### 2.2.2. Operation method

Epidural or general anesthesia with a high hip pad was used. Group A: Anterior lateral incision at the hip, of about Evans-Jensen classification 10 cm, skin and subcutaneous tissues were incised layer by layer, fully exposing the broken end of the fracture in C-arm fluoroscopy guided traction and reduction of fractures. A 135 DEG localizer was used, in tuberosity below about Evans-Jensen classification 3 cm, drilled into the Kirschner's wire, through the femoral distance to stock head under the cartilage. A C-arm check reset was used and G's needle position to determine a suitable location with a Shun Kirschner needle as a guiding

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hole, the screws were screwed into the main tension screw, and then set into the sliding fixed plate. In the main nail on top of the 1 cm hole, a hole was again drilled and the hollow screw can play an effective role in rotation. The C type arm inspection was used to produce good reduction. The wound was washed, drainage tube placed and the incision was sutured. Group B: The same surgical procedures as group A were used. To reduce fracture traction and auxiliary poking, the right proximal femoral locking plate was chosen. A thick grand physiological radian was placed in the lateral femur. A thin Kirschner wire was placed through the pore plate temporarily fixing the holding plate. The first 3 pieces of 2.5 mm grams were drilled in, C type arm with femoral X-ray were used to nearly correct the lateral direction and determine the location and depth of the temporary internal fixation needle. The anteversion and neck shaft angles were noted, and self-locking screws were used along the guided pin. After femoral neck immobilization and gradual plate fixation of distal self-locking screws, necessary selection of pressure holes for the compression fracture was chosen according to the fracture types. Again, the C type arm of the X-ray fracture end were used to determine the location of the fracture, internal fixation screws and plate position. Passive activity was determined to understand whether the fracture is stable. Examination of the fracture end of the reduction was satisfactory after fixation. Normal saline irrigation were utilized, drainage tubes placed and the wound was sutured [2–4].

### 2.2.3. Post-processing

Patients were given antibiotics 1–2 d after surgery and incision drainage within 24 to 36 h and postoperative routine use of low molecular weight heparin sodium within 5–7 d. Limb femoral quadriceps muscle isometric contraction, ankle active flexion and extension activities therapies were done 1–2 d postoperative as well as nursing, local ground friction, turning over of the pat on the back, and atomization inhalation treatment. After 14 to 21 d, patients were encouraged to not introduce load to the healing limb. After 6–8 weeks of gradual loading, regular reviews according to the X-ray film examination were used to adjust the intensity of the affected limb activity, and gradual load walking were done. With regular review of the X-ray after 12–16 weeks, complete loading can be done.

### 2.4. Observation index

The operation time, bleeding volume, post-operative drainage, post-operative hospital stay, fracture healing time and post-operative complications were observed in the two groups. Functional recovery of the hip joint was observed after 1 year of follow-up [5].

### 2.5. Efficacy evaluation criteria

Harris hip function score was used. An excellent rating is 90–100, good for 80–89, and 70–79 is fair, and the differ-

ence was 70.

### 2.6. Statistical analysis

Statistical analyses were done using SPSS 16 statistical software and the data tested for *t* test or  $\chi^2$  test.

### 3. Results

The operation of the two groups were successful, the operation time, bleeding volume, postoperative drainage, hospitalization time and fracture healing time of the B group were significantly less than that of A group ( $p < 0.05$ ). Complications occurred in 6 cases including 2 cases of pulmonary infection, 1 case of hip deformity, and 3 cases of deep venous thrombosis of the lower extremities. 10 cases of postoperative complications were observed in the A group including 4 cases of pulmonary infections, 2 cases of hip deformities, 1 case of lower limb shortening, 2 cases of screw loosening and 1 case of deep venous thrombosis of the lower extremities. The incidence of postoperative complications in the B group was significantly less than that in the A group ( $p < 0.05$ ). All patients were followed up for more than 1 year. In the B group, the Harris score was excellent in 18 cases, good in 9 cases and poor in 1. The percentage of excellent to good was 93.1%. For the A group, the Harris score was excellent in 12 cases, good in 6 cases, moderate in 6 cases and poor in 3 cases with a percentage of 66.7% for excellent to good scores. The percentage in the B group was significantly higher than that in the A group ( $p < 0.05$ ).

### 4. Discussion

The type of fracture in elderly patients with femoral intertrochanteric fracture is more complex, and more comminuted with patients having different degrees of medical history, etc. Through the development of modern medicine, improvements of internal fixation materials and surgical methods along with improvements on the level of diagnosis and treatment during perioperative period, surgical treatment has become the preferred method of treatment. With the development of internal fixation, many choices of internal fixation methods for femoral intertrochanteric fracture were made available such as the proximal femoral anatomic plate, DHS, proximal femoral nail (PFN), proximal femoral locking compression plate (PF-LCP) osteosynthesis and artificial femoral head replacement. Proximal femoral anatomic plate in the shape of the proximal femur is porous and can be screwed from different directions to control fracture fragments. It is conducive to reducing shear resistance in LCP and DCP [6]. Early loading can easily lead to the deformity of the hip and screw fracture, thus is not conducive to early functional exercise.

DHS is the most commonly used in the treatment of femoral intertrochanteric fracture fixation method. The design of the femoral proximal end biomechanical characteristics included not only pressure and sliding of the dual function, but also static and dynamic compression and

tension. Sliding screws at the front end of the thick screw can effectively increase its stability allowing small sliding to pressurize the fracture, promoting fracture healing. The characteristics of DHS are summarized as follows: (1) The sliding screw and lateral plate casing the femoral neck and femoral shaft are fixed together, effectively preventing hip varus; the screw can slide into the sleeve, the fracture can be automatically pressurized in the case of weight, to promote healing; (2) Based on the static and dynamic compression principle, this can reduce the rate of nonunion; (3) The screw sleeve plate on the lateral cortex, mainly share conduction with tension band effect, but when the inner rear side support structure is seriously injured, the pressure side of cortical bone is not complete. The negative heavy pressure side would lose support causing pivot shift and internal fixation will lose tension band effect with a possibility of loosening the increase; (4) DHS operation time is longer, with higher amount of bleeding, weak anti-rotation ability, and incidences of postoperative complications are higher; (5) DHS in the treatment of types I, II, and III intertrochanteric fracture can provide a very good effect, achieve a strong internal fixation, with great efficacy. PF-LCP is a dynamic compression plate (DCP) and limited contact dynamic compression connected plate (LC-DCP) based on the research and development of a new plate screw internal fixation system [7]. Zhang Xue Bing [8] observed that LCP has the following advantages: (1) Plate is nailed as a whole, osteoporotic fracture and complex fracture are held together with strong holding force; (2) Plate bone or periosteum in external fixation need not be pressed, thus improving blood circulation and is conducive to bone healing; (3) A triangular design with a fixed femoral head has good stability, preventing rotation and reduces cutting; (4) Composite hole design is reflected in the same plate, achieving a perfect combination of traditional absolute stability and relative stability within the fixed bracket; and (5) The traditional and emerging pressurized fixed splint elastic fixation is the organic combination of the two kinds of biomechanics internal fixation. The anatomic locking plate is designed according to the shape of the proximal femur. Fracture reduction can be achieved and if the bone surface is attached to clothing, plate support points can make the fracture stably fixed. Plates do not need to be in close contact with the cortical bone and this can effectively protect bone slices of soft fabric and save broken bone pieces. The near end of the 3 pin angle can

provide three-dimensional stability with good anti rotation and anti-shear ability. Three screws combined with the locking plate greatly enhance the femoral head and neck grasping ability. This can effectively avoid the DHS screw from getting loose and dislodged, especially in patients with osteoporosis.

Through clinical observations, it is believed that the anatomical locking plate internal fixation for treatment of intertrochanteric fractures has the advantage of easy operation, less trauma, less blood loss, quick fracture healing, stable fixation, early functional exercise especially for comminuted fractures and senile osteoporotic fracture fixation, thus it is an ideal treatment method.

### Conflicts of interest

These authors have no conflicts of interest to declare.

### Authors' contributions

These authors contributed equally to this work.

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