Effect of dynamic hip screw on the treatment of femoral neck fracture in the elderly

Zhao Wenbo, Liu Lei, Zhang Hui, Fang Yue, Pei Fuxing, Yang Tianfu*

【**Abstract**】**Objective:** To discuss the indications, surgical procedures, and curative effect of dynamic hip screw (DHS) in the treatment of femoral neck fracture in the elderly.

Methods: A retrospective study was conducted to analyse the clinical data of 42 elderly patients who had been treated for femoral neck fracture with DHS in our department between June 2009 and November 2011. There were 21 males and 21 females with a mean age of 68.5 years (range 60-75 years). According to the Garden Classification, there were 19 cases of type II, 21 cases of type III and 2 cases of type IV fractures. By the Singh Index Classification, there were 3 cases of level 2, 19 cases of level 3 and 20 cases of level 4 fractures. The Harris criterion, complications and function recovery after operation were analysed.

Results: The average hospitalization time in 42 patients was 11.2 days (range 7-21 days). All patients were followed up for 12-26 months (mean 18 months). No lung infection, deep venous thrombosis or other complications occurred. Partial backing-out of the screws was found in 2 cases. The internal fixation device was withdrawn after fracture healing. Internal fixation cutting was found in 1 case, and he had a good recovery after total hip arthroplasty. The time for fracture healing ranged from 3-6 months (average 4.5 months). According to Harris criterion, 15 cases were rated as excellent, 24 good, 2 fair and 1 poor. The Harris scale was significantly improved from 30.52±2.71 preoperatively to 86.61±2.53 at 6 months postoperatively ($P<0.05$).

Conclusion: DHS, being minimal invasive, allowing early activity and weight-bearing, is advisable for treatment of elderly patients with femoral neck fracture. In addition, it can avoid complications seen in artificial joint replacement. It is especially suitable for patients with mild osteoporosis.

Key words: *Bone screws; Hip; Femoral neck fractures; Osteoporosis*

As the extension of life expectancy and the increase of motor vehicles, incidence of femoral neck fractures is getting higher and higher.[1,2] Due to a series of complications and high mortality (15% to 20%) in elderly patients following nonsurgical treatment[3,4], it can easily lead to necrosis of the femoral head. So for patients aged over 75 years, arthroplasty is currently a tendency to use.[5] But for patients aged 60-75 years, the choice of operation patterns is controversial.[6,7] Arthroplasty can bring about serious tissue damage, bleeding and infection, as well as postoperative complications such as loosening and dislocation. Dynamic hip screw (DHS) is

sliding fixture, which has a good biomechanical feature and mild injury to tissue. We treated 42 patients with femoral neck fracture aged 60-75 years using DHS during June 2009-November 2011 and the therapeutic effect, postoperative Harris score, complications and functional recovery were analysed.

METHODS

Subjects

There were 42 patients in this series including 21 males and 21 females with a mean age of 68.5 years (range 60-75 years). Among them, 16 cases were left femoral neck fracture and 26 cases were right femoral neck fracture. It took 7.0 hours on average before patients arrived at the hospital (range 2-48 hours). Sixteen patients were combined with internal medicine disease, 5 patients combined with surgical diseases and 3 combined both. According to the Garden Classification, there were 19 cases of type II, 21 cases of type III and 2 cases of type IV

fractures. The osteoporotic condition (by measuring the proximal femur's Singh Index on the X-ray film of the pelvis) is shown in Table 1.

Preoperative treatment and surgical procedure

All the patients were given tibial tubercle traction or skin traction after admission. Preoperative blood glucose was controlled below 8 mmol/L, preoperative blood pressure below 140/90 mmHg, hemoglobin above 70 g/L, PO_2 above 60 mmHg and PCO_2 below 45 mmHg. Under general anesthesia or epidural anesthesia, we conducted a closed reduction under the C-arm machine. Regular disinfection was undertaken after the reduction was confirmed. A 6 cm longitudinal incision was made from the top of femoral greater trochanter, and then the lateral femoral fascia and tendon membrane were cut down to expose the femoral greater trochanter and proximal femur. We put a locater about 2 cm below the femoral greater trochanter and drill a guide needle along the direction of femoral neck. The guide needle should be in the middle of the calcar femorale on anteroposterior X-ray projection and in the middle of the femoral neck axial slice on the lateral projection. The length of the guide pin was measured to make sure

that the nail tip should be about 5-10 cm below the articular cartilage surface of the femoral head. Then a DHS plate was placed and fixed on the lateral side of the femur. After the reduction was satisfactorily ascertained, the incision was closed up.

Postoperative treatment and curative effect evaluation

Antibiotics were used for 1 or 2 days postoperatively to prevent lung infection and urinary infection. Patients were instructed to do some training in bed 24 hours after surgery, then knee joint or ankle joint movement, and nonweight-bearing activities 48 hours after surgery. At 3 months after surgery, patients were allowed to do gradually weight-bearing activities based on the recovery condition on X-ray films.

Harris scoring criteria was adopted to evaluate patients' function preoperatively and postoperatively (90-100 points were rated as excellent, 80-89 as good,70-79 points as fair and less than 70 points as poor).

Statistical analysis

SPSS 13.0 was used for data analysis and paired Student's *t*-test for comparison between groups. Statistical significance is considered when $P<0.05$.

Table 1. Constituent ratio of patients' Singh Index

Singh Index	Mainly compressive trabeculae	Mainly tensile trabeculae	Secondary compressive trabeculae	Secondary tensile trabeculae	Tuberosity trabeculae	Case number (%)
Level 6	Normal	Normal	Normal	Normal	Normal	0
Level 5	Normal	Normal	Discontinuity	Discontinuity	Disappear	0
Level 4	Normal	Decrease	Disappear	Disappear	Disappear	20 (47.6)
Level 3	Normal	Discontinuity	Disappear	Disappear	Disappear	19 (45.2)
Level 2	Decrease	Disappear	Disappear	Disappear	Disappear	3 (7.2)
Level 1	Minor	Disappear	Disappear	Disappear	Disappear	0

RESULTS

The average hospitalization time was 11.2 days (range 7-21 days). The average operation time was 55 minutes (range 50-70 minutes) and the average intraoperative bleeding was 60 ml (range 55-80 ml). All the patients were followed up on an average period of 17.9 months (range 12-26 months). All incisions healed primarily. No lung infection, deep venous thrombosis or other complications occurred. Partial backing-out of the screws was found in 2 cases and their internal fixation device was removed after fracture healing. Femoral head and neck cut-

ting by screws was found in 1 case and a good recovery achieved after total hip arthroplasty. The others were recovered well. There was no complications such as internal fixator loosening, broken, cutting or hip varus deformity (>10 degrees), shortening malformation (>2 cm). The life quality of patients has been improved obviously. The time to healing ranged from 3-6 months (average 4.5 months). The healing rate was 97.6%. According to Harris criterion after operation, 15 cases were rated as excellent, 24 cases as good, 2 cases as fair and 1 case as poor. The Harris score was 32.38±2.79 preoperatively and 86.62±4.10 at 6 months postoperatively (t=68.310, $P<0.05$). Figure 1 shows a typical case.