Myth or Taboo? Use of Long-Threaded Screws in Femoral Neck Fractures

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Background/Purpose: The conventional osteosynthesis technique for these fractures is closed reduction (if necessary) and fixation with multiple cannulated screws or a sliding hip screw. The conventional technique for screw osteosynthesis of femoral neck fractures involves the insertion of cannulated screws in an inverted triangle configuration near the neck cortex without the screw thread crossing the fracture line. However, weight bearing sometimes results in significant shortening of the femoral neck and protrusion of cannulated screws, necessitating their removal because of soft-tissue irritation. We hypothesized that the use of long-threaded screws, in which the thread crosses the fracture line, would hold the thick trabeculae of the femoral neck and head together, thereby decreasing screw sliding and femoral neck shortening in 31-B1 fractures. The purpose of this study was to compare clinical and radiological results of this new osteosynthesis technique (using long-threaded screws) with those of the conventional technique (using shor- threaded screws).

Methods: We compared patients with femoral neck fractures (OTA 31-B1) who underwent osteosynthesis using three conventional short-threaded screws (Group S, n = 38) or the new technique using long-threaded screws after compression (Group L, n =38). Surgery was performed with the patient on a fracture table under general or fluoroscopy-guided spinal anesthesia. The fractures did not undergo disimpaction; however, posterior tilt of the capital fragment (apex anterior angulation) was reduced by internally rotating the leg and applying pressure from the front. Each fracture was first fixed with three 7.0-mm cannulated screws with 16-mm thread inserted percutaneously parallel to each other (within approximately 5°) without convergence or dispersion. When weakening of the lateral femoral cortex occurred, washers were used. The inferior-center screw was inserted from the lateral cortex of the subtrochanteric area, where it was not distal to the center of the lesser trochanter, and along the medial cortex of the femoral neck. The superior-anterior and superior-posterior screws were inserted to form an inverted triangle. The threads were placed in the femoral head and did not cross the fracture line. Compression was performed by tightening the cannulated screws. In Group L, the three screws were then replaced with long-threaded screws (32-mm thread) to hold the proximal and distal fragments together.

Results: Bony union occurred in all cases during follow-up (mean, 42 months). Mean screw sliding distance was 1.38 mm (standard deviation [SD], 1.77; range, 0.00-7.72) for Group L and 3.30 mm (SD, 2.81; range 0.03-12.22) for Group S (P <0.001). Mean Harris Hip Score was 90.6 for Group L and 82.6 for Group S (P = 0.001). Avascular necrosis of the femoral head occurred in one patient (2.6%) in Group L and two patients (5.3%) in Group S (P = 1.000). Results of univariate regression analysis indicated that screw sliding distance was significantly associated with age (P = 0.020) and screw type (P = 0.001). These associations were confirmed by multiple regression analysis (age, P = 0.009; screw type, P <0.001).

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.

Conclusion: Replacement of short-threaded screws with long-threaded screws after compression provided better control of screw sliding and decreased femoral neck shortening, thereby improving functional recovery.

Table 1. Demographic and clinical characteristics of patients treated with conventional osteosynthesis using short-threaded screws and those treated with the new technique using long-threaded screws.

	Short-threaded (n=38)	Long-threaded (n=38)	p-value
Age, y	67.1±14.5	66.7±17.9	0.979
Female, n (%)	27 (71.1%)	26 (68.4%)	0.803*
Body mass index, kg/m^2	22.4±3.6	21.2±3.1	0.363
Bone mineral density, n	-2.1±1.1 (33)	-2.3±0.7 (30)	0.474
Femur neck shortening, mm	8.36±6.12	3.14±3.14	<0.001
Sliding distance of screw, mm	3.30±2.81	1.38±1.77	<0.001
Harris Hip Score	82.6±12.8	90.6±6.5	0.001
AVN, n (%)	2 (5.3%)	1 (2.6%)	1.000†
Removal of screw, n (%)	8 (21.1%)	5 (13.2%)	0.361*

Results are expressed as n (%) or mean±standard deviation. P-values were determined by Mann–Whitney U test, chi-square test,* and Fisher's exact test†

AVN: avascular necrosis of the femoral head

Table 2. Predictors of screw sliding distance.

Variable	Univariate linear regression			Multiple linear regression		
	β	SE	p value	β	SE	p value
Age	0.041	0.017	0.020	0.053	0.020	0.009
Gender	-0.307	0.633	0.630			
BMI	0.116	0.085	0.180			
BMD	0.022	0.327	0.946			
Group	-1.916	0.538	0.001	-2.080	0.538	<0.001

SE, standard error; BMI, body mass index; BMD, bone mineral density.

See pages 47 - 108 for financial disclosure information.