Locking and compression of the lag screw in trochanteric fractures is not beneficial

A prospective, randomized study of 153 cases

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153 patients with a trochanteric hip fracture were operated on with a compression hip screw (CHS) and followed for 4 months. They were randomized into 2 groups, with or without a key and compression of the lag screw. Greater sliding of the lag screw was noted in cases where the compression screw and the key were used, especially in women over 80 years of age and in patients with a previous fracture indicating osteoporotic bone. Use of a key and compression of the lag screw gave no advantage, and we do not recommend this for treatment of trochanteric hip fractures.

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Technical failures, notably non-union, varisation of the fracture and loss of fixation of the implant, occur in about 10 percent of unstable trochanteric fractures treated with the compression hip screw (CHS) (Kyle et al. 1979, Wolfgang et al. 1982, Heyse-Moore et al. 1983, Caudle et al. 1987). We report a prospective, randomized trial in patients having a trochanteric hip fracture, with or without key and compression of the lag screw.

Patients and methods

During 1987–88, 200 patients with a trochanteric hip fracture, 63 men and 137 women, were treated with a CHS. The patients were randomized by drawing a sealed envelope in the operating theater, after the fracture was reduced.

Group 1 was randomized to have a key and a compressing screw of the lag screw and Group 2 had no key and no compressing screw. The mean age of the men in Group 1 was 75 years and in Group 2 77 years and in the women 82 years and 81 years, respectively. The implant used was a sliding screw and a 4-hole plate (CHS Biomet®). Patients with fractures older than 5 days, pathological fractures and subtrochanteric fractures were excluded. We intended to have at least 100 patients in each group, but in Group 1 the surgeon forgot to use the key in 4 cases.

The patients' background factors were noted: age, sex, residence, time of hospitalization and whether the patient was discharged or not, as well as any previous fractures. We classified the position of the implant on the postoperative radiograms: the angle of the plate and the length of the lag screw. The trochanteric fractures were divided into stable or unstable fracture. The fracture was considered unstable if there was no support on the medial part of the cortex (Jensen 1980) or if there was a lack of continuity in the cortical bone on the opposite surface of the 2 main fragments after reduction of the fracture, as defined by Hunter and Krajbich (1978). The duration of the operation and the type of anesthesia were noted. Anteroposterior and lateral radiograms were obtained with the patient on the operating table as well as after 1 week and after 4 months. The rotation of the legs was standardized, using a box with the feet in a neutral position.

Group 1 consisted of 98 patients (36 men and 62 women) and Group 2 had 102 patients (28 men and 74 women). 153 patients were examined after 4 months; 7 were too ill to have a radiogram, and 38 had died (16 men and 22 women). The final sample sizes were 71 in Group 1 and 82 in Group 2.

The mean duration of the operation was 48 ±16 minutes in both groups, the bleeding during operation 218±199 mL in Group 1 and 215 ±182 mL in Group 2 and postoperatively 1.8 units of blood were given in both groups. The sliding screw reached 5 ±3 mm from the joint space, and the angle of the plate was 137 ±4°, and the length of the lag screw was 10 ±1 cm in both groups. There was no difference in the distribution of the fracture types, background factors, position of the implant and the type of anesthesia between the groups.

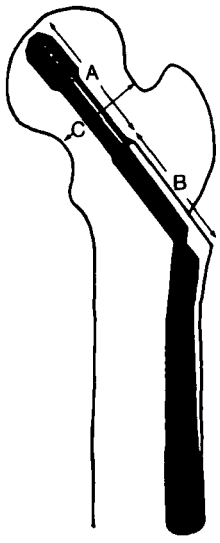

Figure 1. Measurements of the CHS implant on the anteroposterior radiographs.

Table 1. Changes in the CHS implant, according to Figure 1, *SD*

	Number of patients in Groups 1 and 2	A/A+B in Group 1	A/A+B in Group 2	*P*
Postoperatively	98 102	55 *6*	56 *5*	ns
After 4 months	71 82	51 *8*	54 *6*	0.009
Women > 80 years after 4 months	33 38	48 *7*	55 *5*	0.001
Women < 80 years after 4 months	18 25	51 *9*	53 *7*	ns

Group 1 key and compression screw, Group 2 without compression screw.

Early weight bearing had been permitted by the surgeon in 75 and 73 percent, respectively.

After 4 months, varisation of the fracture >10° had occurred in 6/71 in Group 1 (with the key and compression screw) and in 1/82 in Group 2. Non-union was found in 3/71 and 1/82, respectively. Apart from the standard measurements on the radiograms, the visible length of the lag screw (A) and the length of the barrel (B) were measured (Figure 1). A/A+B is the relative length of the visible part of the lag screw. A comparison was also made between these 2 ratios postoperatively and after 4 months. In addition, we measured the distance from the sliding screw tip to the joint space.

Statistics. Student's *t*-test and chi-square with Yates' correction were used. All comparisons were done between Groups 1 and 2.

Results

Compression of the fracture

Postoperatively, the ratio of the lag screw to the lag screw and barrel (A/A+B) did not differ between the groups, counting all 200 hips (Table 1). After 4 months, the length of the lag screw was 6.4 mm less in Group 1 than in Group 2 ($P < 0.009$). All these differences were found in women after the age of 80 years with smaller ratios in Group 1. All 4 non-unions occurred in women.

Among the stable fractures, there was no difference in the ratio between the groups, either in the men or the women. In the unstable fractures, there were no differences between the ratios in the men, but among the women the compression ratios were smaller than in Group 1. The length of the visible part of the lag screw was 11 mm less in Group 1 at 4 months.

To determine the influence of increasing osteoporosis, we studied only those who had had an earlier fragility fracture. These women had a greater sliding of the lag screw in Group 1, the visible part of the lag screw being 14 mm shorter at 4 months.

Discussion

According to a nationwide inquiry in Sweden concerning methods of treatment of trochanteric hip fractures, 34 percent of all fractures in 1982 were treated with a CHS device. This had increased to 86 percent in 1990 (Sernbo and Fredin 1993). It has been debated whether one should use a compression screw and a key of the lag screw in CHS. Recently, a new type of fixation device has been presented for treatment of trochanteric hip fractures (Medoff and Maes 1991). In this device there is a locking set screw on the proximal compression screw to prevent further impaction.

We found more sliding of the lag screw in the group with the key and compressing screw, mainly in women over 80 years with unstable fractures. It was even more marked in those who had had a previous fracture, possibly due to osteoporosis.

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