ABSTRACT

Purpose. To report results of twin hook fixation for proximal femoral fractures in comparison to those fixed with the conventional lag screw.

Methods. Between August 2005 and July 2006, 2 men and 15 women aged 74 to 94 (mean, 85) years with proximal femoral fractures underwent open reduction and internal fixation using the twin hook system. The tip-apex distance was compared with that in 20 patients treated with the sliding hip screw between August 2004 and July 2005.

Results. In the 17 patients, the hook was inserted into the centre of the femoral head. Bone union was achieved and no intra- or post-operative cut-out or device failure was encountered. In patients using the twin hook and sliding hip screw respectively, the mean tip-apex distance was 22.3 mm and 14.6 mm (p<0.001).

Conclusion. Using the twin hook system requires more surgical skill than using the sliding hip screw, because failure to insert the pin into the centre of the femoral head risks intra-articular perforation by the hooks.

Key words: femur head; hip fractures

INTRODUCTION

Sliding hip screws and short femoral nails are commonly used for internal fixation of proximal femoral fractures, and give rise to stable clinical results. However, one to 4% of those fixed by sliding hip screws and 6 to 8% of those fixed by short femoral nails require revision for femoral head cut-out. A Hansson twin hook system (Stryker Osteosynthesis; Selzach, Switzerland) has been developed as an alternative to the lag screw for use with a dynamic plate. We aimed to report the results of twin hook fixation for proximal femoral fractures in comparison to those fixed with the conventional lag screw.

MATERIALS AND METHODS

Between August 2005 and July 2006, 2 men and 15 women aged 74 to 94 (mean, 85) years with proximal femoral fractures underwent open reduction and internal fixation using the twin hook system.
According to the AO/OTA classification, fractures were classified as 31-A1 (n=5), 31-A2 (n=9), 31-B1 (n=2), and 31-B2 (n=1). The interval from admission to surgery ranged from one to 10 (mean, 4) days.

The twin hook system resembled the Hansson Pin with a cannulated nail (8 mm in diameter), with 2 apical apertures on the nail (Fig. 1). By rotating the handle of the insertion assembly, both hooks were forced out through the apertures into the subchondral bone of the femoral head in anterior and posterior directions. The shape of the apertures enabled the hooks to deploy in arches with their convex side facing the periphery of the femoral head and keyed by the plate barrel, thus preventing rotation. The insertion sites were classified according to zones on anteroposterior and lateral radiographs (Fig. 2).

Postoperatively patients were kept in bed for one day and allowed to use the wheelchair the next day. Weight-bearing walking as tolerated was allowed on day 3. The mean follow-up period was 17 months.

The distance from the tip of the hook to the apex of the femoral head (tip-apex distance) was compared with that in 20 patients treated with the sliding hip screw between August 2004 and July 2005.

RESULTS

The lengths of the twin hooks used were 70 mm (n=3), 75 mm (n=1), 80 mm (n=5), 85 mm (n=4), 90 mm (n=2), and 95 mm (n=2). A 3-hole side plate was used in 6 patients, and a 2-hole side plate in the remaining 11. The mean operating time was 37 (range, 22–73) minutes and the mean length of skin incision was 5 (range, 4–7) cm. The hook was inserted into the centre of the femoral head (zone 5) in all 17 patients (Fig. 3).

Bone union was achieved in all 17 patients. No intra- or post-operative cut-out or device failure was encountered. In patients using the twin hook and sliding hip screw respectively, the mean tip-apex distance was 22.3 (range, 13–32) mm and 14.6 (range, 5–25) mm (p<0.001, Student’s t test).

DISCUSSION

The risk of cut-out decreases when the lag screw is inserted to an adequate depth, with a tip-apex distance of less than 20 mm. When the twin hook is used, excessively deep insertion risks intra-articular perforation of the femoral head by the hooks. Further
study is required to determine optimal placement of the twin hook.

Compared to the lag screw, the twin hook is easy to handle and reduces incision and soft tissue dissection.\textsuperscript{4,5} It causes little destruction of the bone trabeculae during insertion, even in patients with severe osteoporosis, thus providing superior rotational stability and reducing complications such as cut-out.\textsuperscript{3} In basicervical fractures of the femoral neck, the proximal fragment has a tendency to rotate along with the lag screw during insertion. No rotational force is exerted during the twin hook insertion; invasion of the cancellous bone is minimal. Therefore, the system is applicable not only for trochanteric fractures but also for basal fractures of the femoral neck or subcapital fractures. In our study, 2 patients with 31-B1 subcapital fractures had good outcomes after twin hook fixation. In future, the combination of a short femoral nail (Gamma type) and a twin hook can be used in unstable trochanteric fractures.

More precise surgical technique is required to ensure adequately deep insertion of the twin hook into the centre of the femoral head. The twin hook may be removed with the plate \textit{in situ} in the event of perforation or other complications, and then replaced with a nail inserted more distally into the intact cancellous bone of the femoral head.\textsuperscript{3} In contrast, withdrawal of the keyed lag screw requires breakage of the bone laminae, making re-establishment of purchase by the threads not feasible. When local irritation is caused by the distal end of the twin hook, it may be easily removed with the plate \textit{in situ}. With the lag screw, concomitant removal of the plate is required.

REFERENCES