



External fixation of intertrochanteric fractures in elderly high-risk patients

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Intertrochanteric fractures of the femur were treated with an external fixator in 38 elderly high-risk patients between November 2005 and February 2007. The mean operation time was 25 min (range : 20 to 32 min), the mean fluoroscopy time was 15 sec (range : 10 to 18 sec), and the mean hospital stay was four days (range : 3 to 7 days). The average time to union was 9.5 weeks. No deep pin track infections occurred ; superficial skin inflammation was seen in 30%. Implant failure or knee stiffness were noted in no instance. At the latest follow-up, the mean femoral shaft-neck angle was 130° (range : 116° to 138°), the average Harris hip score was 64 (range : 50-80). Mortality rate was 8% at 6 months from causes unrelated to the operation.

The use of a multiplanar external fixator in these patients provided a satisfactory stability, reduced their time in hospital and facilitated their postoperative rehabilitation.

Keywords : intertrochanteric fracture ; external fixator.

cerebrovascular problems, chronic obstructive pulmonary disease, diabetes mellitus, or severe anaemia. On the other hand, conservative methods of treatment are associated with complications of prolonged recumbency (11,12).

Based on the view that reducing both the operation time and the immobilization period is of vital importance particularly in elderly patients with intertrochanteric femoral fractures. we evaluated the use of a modified ring external fixator in the treatment of intertrochanteric femoral fractures with a simple rapid technique.

PATIENTS AND METHODS

Between November 2005 and February 2007, 38 elderly patients with intertrochanteric fractures were treated with a modified ring external fixator under local anaesthesia in our emergency hospital. There were 15 female

INTRODUCTION

Increase in longevity combined with osteoporosis and muscular insufficiency may explain the increasing number of patients with intertrochanteric fracture (1,4). Open reduction and internal fixation of intertrochanteric fractures is the routine procedure, but the morbidity and mortality rates are high, especially in older patients with associated morbidities such as ischaemic cardiac disease, hemiparesis,

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and 23 male patients with an average age of 65 years (range : 57 to 90 years). All patients had a high risk for an open surgical procedure or for long lasting anaesthesia because they had one or several co-morbidities.

The mechanism of injury and pre-injury ambulatory status were recorded. All patients sustained their fractures after a low-energy trauma. Preoperatively, 24 (63%) patients did not require ambulatory aids, 14 patients (37%) required a cane or a walker.

General physical examination and necessary investigations were done in all patients to assess their medical condition. Attempts were made to stabilize preexisting conditions before surgery. Preoperative internal medicine and anaesthesia consultation were obtained as required by the patient's overall medical condition. The inclusion criteria for the study were based on a moderate or high surgical or anaesthetic risk for prolonged or invasive surgery according to the American Society of Anesthesiologists risk score (15). According to this score 27 (71%) patients were classified as Grade III, and 11 (29%) as Grade IV.

All patients were evaluated preoperatively with standard anteroposterior (AP) and lateral X-ray views of the affected hip. Fracture types were graded according to the Boyd and Griffith classification : there were 8 (21%) type I, 14 (37%) type II, 10 (26%) type III and 6 (16%) type IV fractures.

Preoperatively, we constructed an external fixator formed of two femoral arches connected to each other by two rods 15 cm in length and two joints (to make an angle between the proximal and distal arches equal to the neck shaft angle) (fig 1). Two cubes were attached to the proximal arch in a manner that allowed three 5 mm cancellous Schanz screws to be inserted parallel to each other across the fracture site up to the subchondral bone in the femoral head and in two planes forming a triangle in cross section (fig 2).

OPERATIVE TECHNIQUE

All patients were operated under local anaesthesia with 3 mg/kg lidocaine infiltrated into subcutaneous tissue and down to the periosteum at the site of pin insertion. An intramuscular injection of a sedative (5-10 mg diazepam) and an analgetic (50 mg tramadol) was given 30 minutes before surgery. Closed reduction of the fracture was done on a fracture table by gentle traction and manipulation under fluoroscopy to obtain an acceptable reduction before surgical skin preparation and draping. The



Fig. 1. — The external fixator with the joints between proximal and distal rings.

reduction was checked by fluoroscopy. After obtaining a satisfactory reduction, the first Schanz screw was inserted under fluoroscopy in the inferior-posterior part of the neck and head. This Schanz screw was called the reference screw. Since the holes in the cubes are parallel to each other the remaining two Schanz screws could be inserted without using fluoroscopy. The second Schanz screw was inserted through the adjacent anterior hole of the same cube. The third Schanz screw was inserted in the other cube parallel to the previous two screws thus reducing the time needed to check



Fig. 2. — Two cubes are attached to the proximal arch allowing three 5 mm cancellous Schanz screws to be inserted parallel to each other and in two planes forming a triangle in cross section.

the position of the Schanz screws in the neck. Once the fracture site was stabilized by the three trochanteric Schanz screws, two 5-6 mm Schanz screws were inserted at right angles into the shaft fragment and fixed with cubes to the distal arch. The Schanz screws in the femoral shaft were inserted posterior to or through the iliotibial tract which was incised in a cross section manner at the site of entry of the Schanz screw.

Final radiographs were taken to check the reduction at this time. We recorded the duration of the procedure and of fluoroscopic exposure. On the first day, patients were assisted in sitting, turning on the bed, knee joint flexion, quadriceps and breathing exercises. Non weight bearing ambulation using crutches was permitted 3 weeks after operation, with progression to partial weight bearing at 6 weeks. Full weight bearing was allowed when complete radiological healing of the fracture was obtained.

The patients were taught to do dressing of pin sites twice per day and were discharged from the hospital within 2-5 days postoperatively.

Follow-up evaluation was performed every three weeks. We noted the ambulatory status, wasting of quadriceps muscles. Radiographs of the affected hip were obtained at each follow-up to assess any

change in the position of the implants, adequacy of reduction, neck-shaft angle, the extent of fracture union (fig 3), and complications if any. At the last assessment, clinical results were assessed with the Harris hip score (5).

RESULTS

Surgery was performed after a mean of 5.8 days following trauma. The average follow-up period was 2 years (range : 10 months to 3 years).

The average operative time was 25 minutes (range : 20-32 min.). The average hospital stay was 4 days (range : 3-7 days). The average time of fluoroscopy was 15 seconds (range : 10-18 sec) excluding time of manipulation for closed reduction.

The average time to union was 9.5 weeks (range : 8-14 weeks).

Superficial skin reaction at pin sites was noted in 30% of patients. No cases of deep infection, knee stiffness or implant failure were noted.

Fixator removal was done at the outpatient clinic after an average time interval of 15 weeks.

The radiographs at the last assessment revealed a mean neck-shaft angle of 130° (range : 116°-138°).

Shortening less than 1.5 cm was noted in two patients. Pin bending was noted in one case following a subsequent trauma.

Five out of the 24 patients who were not using ambulatory aids preoperatively, required a cane or a walker at final follow-up.

Time to full weight bearing averaged 13 weeks (range : 9-16 weeks).

Five patients had wasting of their quadriceps muscle, which recovered its strength after an extensive program of physiotherapy.

The mortality rate at 6 months was 8% (3/38 patients) from causes unrelated to the operation.

The average Harris score of the remaining 35 patients at latest follow-up was 61 (range 45-80).

DISCUSSION

Fractures of the proximal femur have been marked as one of the biggest problems of the contemporary civilization. The patients with this



Fig. 3. — Preoperative (a, b), immediate postoperative (c, d), (e, f) solid union and restoration of normal neck shaft angle

type of fracture occupy at least 30% of beds in the orthopedic institutions (16). Trochanteric fractures are a usual occurrence in older patients, above 65 years of age, when there is far greater loss of the skeletal mass (osteoporosis) (6,7).

Elderly patients are high-risk patients for surgery (9), and every effort should be made to reduce the operating time, reduce hospital stay, and permit early mobilization of geriatric patients with associated medical problems. This prompted us to propose

external fixation as an alternative treatment option for these elderly, high-risk patients.

In patients with a high surgical risk, conservative treatment by traction in bed is good provided the patient can survive the hazards of prolonged recumbency. In a developing country like ours, this type of treatment for intertrochanteric fractures is not suitable because it involves a high bed occupancy rate in the hospital. Keeping patients on traction for eight to twelve weeks at least would be difficult ; external fixation may therefore be a suitable treatment for those patients with high operative risk.

In high-risk elderly patients, the duration of surgery and amount of blood loss are important controllable variables that affect patient morbidity. The average operative time in this study was 25 minutes. This is shorter than reported by Ufuk *et al* and Tomak *et al* (13,14). We believe that the method used in this study, with insertion of the other two Schanz screws parallel in relation to the first inserted Schanz screw, with aid of the pin clamps, provides significant reduction in operation time in comparison to any other method. Additional advantages of external fixation include the possibility of application under local anaesthesia for patients who have poor general health in whom other options are not available. As reported in previous studies (2,3) no intraoperative complications occurred and there was no need for intraoperative blood transfusion as the blood loss was negligible.

Initial knee stiffness was recorded in the majority of patients treated with other fixator types (2,8). Knee stiffness was not a problem in this study because our frame is too short to transfix the vastus lateralis for a long distance ; in addition, the distal Schanz screws were, whenever possible, inserted posterior to the iliotibial tract.

In this study the proximal pins are inserted parallel in the neck and head and in two or three planes, which is provided by two cubes attached to the proximal femoral arch. This multi-planar fashion seems to provide more stability than the uniplanar pins used in a tubular external fixator (2). However, this needs further biomechanical analysis.

Shortening less than 1.5 cm occurred in two cases. This was probably due to the type and pattern of fracture and its subsequent stability that led to

collapse of the neck shaft angle on weight bearing. Kourtzis *et al* (10) suggested that the low demands of the elderly permit this degree of shortening to entail no significant functional compromise.

Patient compliance with the external fixator is an important point for success of the treatment. In this study all patients were compliant with the frame as it is simple, formed of two arches. This allows sitting, lying on side and standing at ease. It was our impression that early weight-bearing with crutches on the fractured limb gave confidence to patients and encouraged them to stay out of bed, and to undertake daily activity. This encouragement gave the patients more confidence in returning to an unaided life.

Infection was the most commonly encountered complication in this study. Most patients had superficial pin tract infection during the course of treatment. This complication was more evident in obese patients. This high incidence may be due to the patients involved in this study being immunocompromised, and to the social situation of some patients. A high incidence of superficial infection was also reported in previous studies (2,3).

Based on our observations, we conclude that external fixation of intertrochanteric fractures can provide an alternative method of fixation in elderly high-risk patients. It can be done under local anaesthesia, and reduces the complications associated with major surgical procedures. It has good outcome in high-risk geriatric patients, provided due consideration is given to the pin-site care in these older patients.

REFERENCES

1. Christodoulou NA, Dretakis E. Significance of muscular disturbances in the localization of the fractures of the proximal femur. *Clin Orthop Relat Res* 1984 ; 187 : 215-217.
2. Dahl A, Varghese M, Bhasin VB. External fixation of intertrochanteric fractures of the femur. *J Bone Joint Surg* 1991 ; 73-B : 955-958.
3. Devgan A, Sangwan SS. External fixator in the management of trochanteric fractures in high risk geriatric patients. A friend to the elderly. *Indian J Med Sci* 2002 ; 56 : 385-390.
4. Dretakis E, Christodoulou NA. Significance of endogenic factors in the location of fractures of the proximal femur. *Acta Orthop Scand* 1983 ; 54 : 198-203.

5. **Harris WH.** Traumatic arthritis of the hip after dislocation and acetabular fractures : treatment by mold arthroplasty. An end-result study using a new method of result evaluation. *J Bone Joint Surg* 1969 ; 51-A : 737-755.
6. **Hordon LD, Paacock M.** Osteomalacia and osteoporosis in femoral neck fractures. *Bone Miner* 1990 ; 11 : 247-259.
7. **Johnell O.** Prevention of fractures in elderly. *Acta Orthop Scand* 1995 ; 66 : 90-98.
8. **Kamble KT, Murthy BS, Pal V et al.** External fixation in unstable intertrochanteric fractures of femur. *Injury* 1996 ; 27 : 139-142.
9. **Kenzora JE, McCarthy RE, Lowell JD, Sledge CB.** Hip fracture mortality : relation to age, treatment, preoperative illness, time of surgery and complications. *Clin Orthop Relat Res* 1984 ; 186 : 45-56.
10. **Kourtzis N, Pafilas D, Kasimatis G.** Management of pertrochanteric fractures in the elderly patients with an external fixator. *Injury* 2001 ; 32 : S-D-115–S-D-128.
11. **Schneider M.** Hip fractures in elderly patients. *JAMA* 1978 ; 239 : 106-107.
12. **Stevens DB.** Method of operative treatment of intertrochanteric fractures of the femur. *Curr Pract Orthop Surg* 1977 ; 7 : 56-57.
13. **Tomak Y, Kacaoglu M, Piskin A et al.** Treatment of intertrochanteric fractures in geriatric patients with a modified external fixator. *Injury* 2005 ; 36 : 635-643.
14. **Ufuk O, Atilla S.P, Gul M et al.** Management of osteoporotic pertrochanteric fractures with external fixation in elderly patients *Acta Orthop Traumatol Turc* 2008 ; 42 : 246-251.
15. **White BL, Fisher WD, Laurin CA.** Rate of mortality for elderly patients after fracture of the hip in the 1980's. *J Bone Joint Surg* 1987 ; 69-A : 1335-1140.
16. **Zetterberg C, Andersson BJ.** Fractures of the proximal end of the femur in Goteborg, Sweden, 1940-1979. *Acta Orthop Scand* 1982 ; 53 : 419-426.