

TREATMENT OF INTERTROCHANTERIC FRACTURES BY EXTERNAL FIXATION

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In this study, we aimed to evaluate the results of treatment of intertrochanteric fractures of the femur by external fixation in 33 patients with an average age of 65.9 years. Patients in the study had Evans stable type 1 intertrochanteric fractures and unstable type 1 fractures that could be reduced to anatomical or nearly anatomical position by closed manipulation under fluoroscopy. The average follow-up period was 24 months (range, 12 to 40 months). There was no mortality in the early postoperative period, but the mortality within six month following surgery was 39%. Complete fracture healing was achieved in all patients. The fixator was removed after an average of 94 days (75 to 130 days) at the outpatient clinic. Varus malalignment of more than 20° and limb shortening greater than 2 cm were noted in 3 patients. Pin-tract infection was seen around 10 pins (7%). Osteomyelitis was not noted in any patients. Treatment of intertrochanteric fractures by external fixation is simple and can be done under local anesthesia together with narcotic analgesic support. It allows early mobilization, and implant removal is easy. Therefore we think that external fixation is a valuable alternative in high-risk geriatric patients.

Keywords : fémur ; intertrochanteric fracture ; external fixation.

Mots-clés : fémur ; fracture pertrochantérienne ; fixation externe.

INTRODUCTION

Intertrochanteric fractures generally occur as a result of low-energy trauma (such as simple falls) in advanced age, whereas they are caused by high-

energy trauma in young individuals (19). Increased longevity, together with osteoporosis and senile muscular insufficiency, may explain the increasing number of patients with intertrochanteric fractures (7).

The main aims of the treatment of intertrochanteric fractures are to mobilize the patient in a short period of time and to ensure union in the appropriate position (8). These aims can only be achieved by surgical methods. Implant failures and malunions are frequently observed in osteoporotic patients treated by internal fixation (8, 14). Many internal fixations devices, such as angulated plates, sliding nail-plates, gamma nails and intramedullary hip screws have been used.

Intertrochanteric fractures mostly occur in patients with poor general condition who cannot undergo general anesthesia or who are not fit for an invasive intervention owing to diabetes, atherosclerotic heart disease or chronic obstructive pulmonary disease. Treatment of such patients by long-term immobilization following internal fixation is not possible owing to the risk of decubitus ulcers, pneumonia, urinary tract infections, deep venous thrombosis and cardiopulmonary complications (7, 8, 10, 11, 12).

Anderson *et al.* used external fixation for the treatment of fractures of the intertrochanteric

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region for the first time in 1943 (1). Scott also used it because of its advantages such as short operation time, early postoperative mobilization, preservation of the fracture hematoma and early union of fracture (3, 5, 9, 20).

We retrospectively evaluated the results in cases that were treated by external fixation since 1994 for intertrochanteric fractures, to assess the value of this treatment method in certain patient groups.

MATERIAL AND METHODS

Thirty-three patients, 19 males and 14 females, with intertrochanteric fracture of the femur were treated by external fixation between 1994 and 1999. Fifteen patients had right and 18 had left intertrochanteric fractures. The mean age of the patients was 65.9 (47 to 90) years. Eight fractures were the result of traffic accidents and 25 of falls. The patients had high surgical and anesthetic risk factors for an open surgical procedure or for extended anesthesia because they had more than one accompanying disease. Seventeen patients had ischemic cardiac disease, 18 pulmonary disease, 10 diabetes mellitus, 14 hypertension, 5 heart failure, and 9 had cerebral dysfunction. The average time of hospitalization was 2.8 days (0 to 21 days). External fixation was used in patients with Evans stable type 1 intertrochanteric fractures and unstable type 1 fractures which could be reduced to anatomical or nearly anatomical position by closed methods under fluoroscopic control.

The patients were operated on average 5.7 days (2 to 11 days) following admission. During the operation, 3 patients had undergone epidural, 21 spinal, 6 general and 3 local anesthesia together with narcotic analgesic support. The average time of operation was 30 (20 to 45) minutes.

The patient was placed on an orthopedic table, and reduction was checked by fluoroscopy. Reduction was achieved by moving the limb into 20°-30° abduction and 10°-15° internal rotation on the fractured side. A 3-mm guide wire was then introduced under fluoroscopy into the head with the appropriate neck-shaft angle and anteversion angle. The guide wire was introduced using a manual perforator.

The first pin was inserted through a small incision at the base of the greater trochanter, across the fracture site into the femoral neck. One or two more pins were inserted. The tips of the pins were at a 10 - mm distance from the joint line (fig. 1). The proximal part of the external fixator allows the insertion of the proximal Shanz pins at

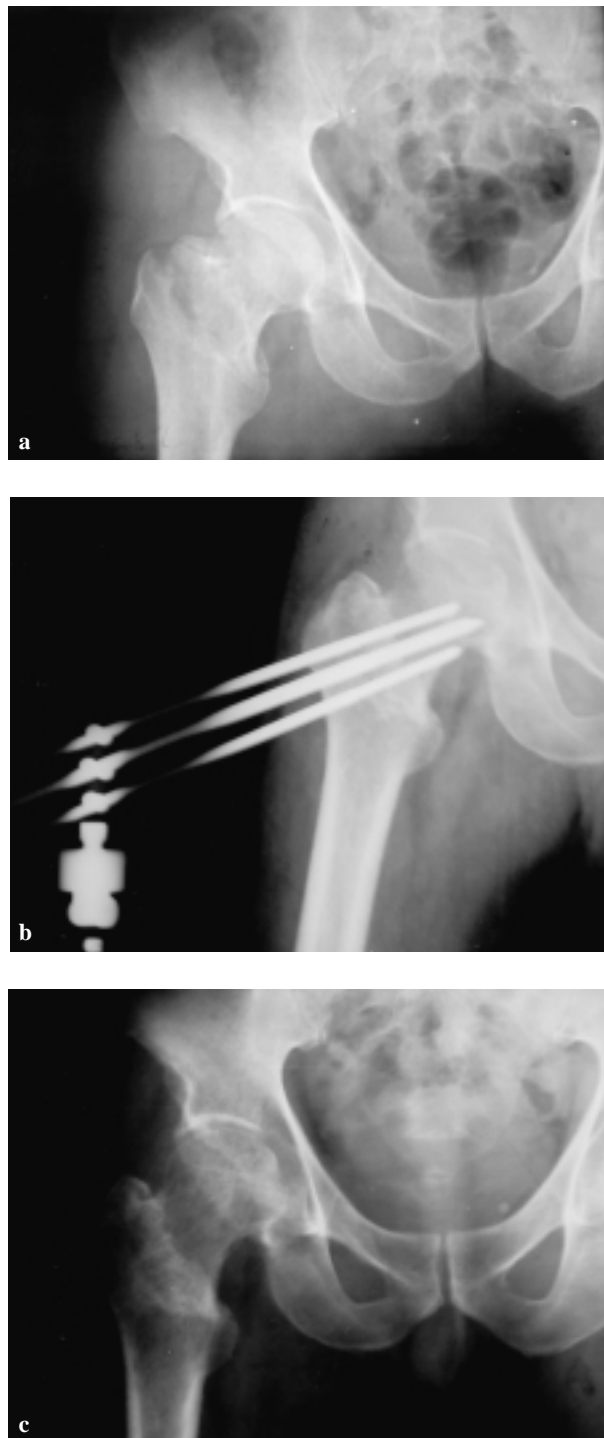


Fig. 1. — The right hip of a 60-year-old male patient.

1a) Preoperative xray.

1b) Anteroposterior xray with external fixation 75 days postoperatively.

1c) Anteroposterior xray 85 days postoperatively (after fixator removal).

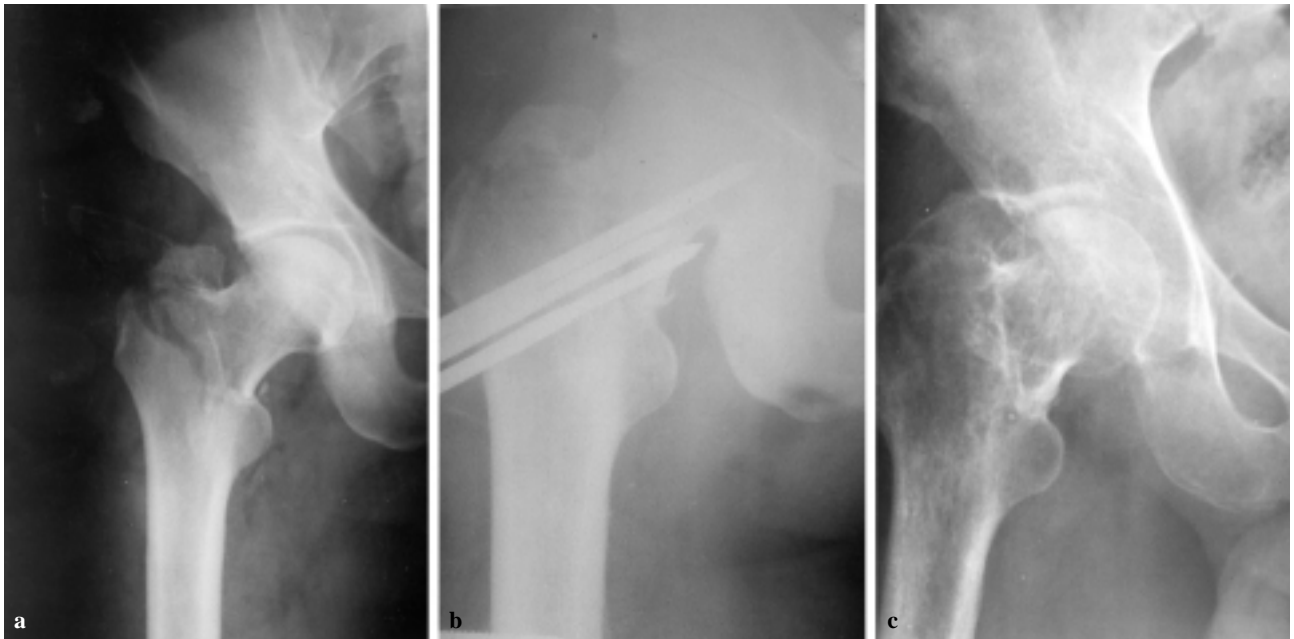


Fig. 2. — The left hip of a 55-year-old male patient.
 2a) Preoperative anteroposterior xray.
 2b) Anteroposterior xray with external fixation postoperatively.
 2c) Anteroposterior xray one year postoperatively.

a 135° angle to the stem of the fixator. Three 5-mm pins were inserted into the middle third of the shaft of the femur. In order to increase the range of motion, the knee was put into flexion at 90° during insertion of the pins. A final check by fluoroscopy was made.

Active hip and knee exercises were started on the first postoperative day. The patients were mobilized on the second or third day with partial weight-bearing using a walker; they were discharged on average eight days (4 to 20 days) after operation.

Outpatient clinic evaluations were made at 15-day intervals, and knee movements, pin-tract infection and consolidation of the fracture were evaluated by radiography. The fixators were removed after an average of 94 (75 to 130) days under outpatient clinic conditions. The patients were seen for evaluation at 2-month intervals.

RESULTS

The mean follow-up period was 24 months (12-40 months). Mortality three months following surgery was 15%. The six-month mortality was 39%. There was no mortality in the early postoper-

ative period. In several cases, relatives of hemodynamically unstable patients did not allow the operation when informed about the possibility of death during operation, and they took the patient home without any operation.

Twenty of the 24 surviving patients were evaluated clinically and radiographically. On AP pelvic xrays, varus deformity and clinically, the distance between the anterosuperior iliac spine and the medial malleolus and between the umbilicus and the medial malleolus were evaluated, and the length discrepancies between extremities were recorded.

Two patients could walk with crutches (one patient was in the same situation before the fracture), 10 could walk with a single crutch (six patients were in the same situation before the fracture) and 8 could walk without any support at the last check-up (fig. 2). Fifteen of 20 patients (75%) regained their previous walking ability.

Malunion was detected in 3 patients (15%). Shortening greater than 2 cm was noted in these patients at the latest follow-up as a result of varus

malunions. Regarding knee motion, all patients had limited flexion in the postoperative period; however, recovery was seen during the follow-up. At the final evaluation, the mean range of motion of the knee was 98° (range, 70° to 120°). Three patients (15%) had less than 90° range of motion of their knees.

Pin-tract infection was observed around 10 pins (7%). The patients who had grade I (soft tissue inflammation) and II (soft tissue infection) pin tract infections, were treated with wound dressing and antibiotic medication. None of the cases developed osteomyelitis. No material failures occurred.

DISCUSSION

Intertrochanteric femoral fractures are one of the most important fractures of the lower extremity. The prevalence of hip fractures is increasing owing to the increase in life expectancy and the inefficient treatment of osteoporosis, which still is the basic factor for such fractures (8, 14). Owing to advanced age, the first goal is patient survival. The main objective of the treatment is to minimize the complications related to age and immobilization. This can be achieved using internal or external fixation.

The most efficient conservative treatment method is the modified Hamilton Russell traction. It requires that the patient should be hospitalized for at least 2 to 3 months, and complications may be seen (8).

Open reduction and internal fixation of trochanteric fractures is the routine procedure, but in patients at risk with accompanying pathology, such as ischemic cardiac disease, chronic obstructive pulmonary disease, diabetes mellitus, or severe anemia, there is a high risk of anesthetic or postoperative complications (7, 8, 12). Many internal fixations, such as angulated plates, sliding nail-plates, gamma nails and intramedullary hip screws have been used. A sliding hip screw is the implant of choice for the treatment of both stable and unstable intertrochanteric fractures (13, 18). Use of this implant for intertrochanteric fracture stabilization is associated with a 4% to 12% incidence of loss of fixation (18). Theoretical advantages of intra-

medullary hip screws and gamma nails are both technical and mechanical compared to the sliding hip screw. Most studies comparing these devices to sliding hip screws have found no differences with respect to surgical time, duration of hospital stay, infection rate or wound complications, implant failure, screw cut out, or screw sliding. Patients treated with an intramedullary hip screw, however, are at increased risk for femoral shaft fracture at the nail tip and the insertion sites of the distal locking bolts. The prevalence of diaphyseal fractures has been reported to range from 0% to 17% (6, 13, 18). Furthermore, since the patient cannot walk with full weight bearing until union is achieved following internal fixation, rapid rehabilitation cannot be achieved. The difficulty and delay of rehabilitation in these patients who have systemic problems and a decreasing will and joy to survive aggravates the problems and leads to an increase in the early mortality rates (10).

Total hip arthroplasty may be indicated in patients with intertrochanteric fracture and preexisting osteoarthritis. However, this may not be possible owing to the general condition of the patient whereas external fixation may be used even in hemodynamically unstable patients. Secondary prosthetic arthroplasty may be performed after removing the external fixation, if the cultures are negative after antibiotic suppression, and after a minimum period of 15 days follow-up. If there is a risk for infection, a Girdlestone arthroplasty may be required but this did not occur in any of our cases. External fixation in intertrochanteric fractures can be considered to be a semi-conservative method (10). It may be a reasonable alternative for patients who are of advanced age, have a poor general condition and cannot tolerate long operations (12). With external fixation, the average anaesthesia time was 30 minutes including reduction and percutaneous application compared with 72 to 100 minutes for open reduction and internal fixation procedures (7, 10). External fixation technique gives shorter anesthesia time, minimal surgical trauma, and minimal blood loss. This is a very important point to stabilize the general medical condition in such elderly patients and to prevent postoperative complications such as urinary tract

infections, pneumonia, decubitus ulcers, and deep wound infection (3, 10). These postoperative complications have been associated with increased mortality rates (10, 16, 17). External fixation preserves the fracture hematoma, which is of importance for union. Complete fracture healing occurred in all our patients. The average time to complete union was 94 days as compared to 4 to 5 months after open reduction and internal fixation procedures (2, 10). Christodoulou *et al.* have compared the results in patients who were treated by external fixation or internal fixation. According to their study, in the external fixation group, operating time was 35 minutes, hospital stay was 6 days, varus deformity was detected in 5 patients. Three of them were corrected by fixator. They have reported operating time as 75 minutes, hospital stay 16 days, varus deformity in three patients in the internal fixation group (7). The average hospital stay in our cases was 8 days.

Possible complications of treatment of intertrochanteric fractures using external fixation are pin-tract infection, varus deformity and shortening. However, the literature review shows that such complications occur with a low rate. The advantage of external fixation in unstable intertrochanteric fractures is that it is possible to correct these deformities, especially in the first postoperative days, without open surgical intervention (7). The rate of infection varies between 2 and 25% (4, 10, 15). We observed 10 (7%) pin-tract infections. The patients were treated with wound dressing and systemic antibiotic medication. Thermal necrosis caused by high-speed drilling may lead to infection (20); we therefore used manual drills. Most of our patients applied dressings themselves at home and did not pay attention to sterility as required. Malunion was detected in three patients (15%). As a result of varus malunion, more than 2-cm limb shortening was noted in these patients at the latest follow-up. Regarding knee motion, all patients had limited flexion in the postoperative period probably as a result of the fixation of the soft tissue; however, improvement was identified during follow-up (10).

In conclusion, external fixation of intertrochanteric fractures is less invasive than internal

fixation and does not evacuate the fracture hematoma, which is of great importance for union. It is easily applied in a short surgical session and can be performed under local anesthesia when necessary. It allows early mobilization, and the fixator can be removed easily under outpatient conditions. Pin-tract infection which can be considered as a disadvantage can be prevented or minimized by introducing the nails with a manual perforator and appropriate pin-tract care. Therefore, it may be considered to be an alternative treatment modality for high-risk geriatric patients with selected fracture types. This technique is simple, safe and can be performed under regional and even local anesthesia together with narcotic analgesic support when required.

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SAMENVATTING

M. SUBASI, C. KESEMENLI, A. KAPUKAYA, S. NECMIOGLU. Uitwendige fixatie als behandeling van intertrochantere fracturen.

De resultaten van behandeling van intertrochantere fracturen van het femur bij middel van uitwendige fixatie worden bestudeerd in 33 risico-patiënten met een gemiddelde leeftijd van 65.9 jaar. Het ging om stabiele en instabiele type I Evans breuken, gereduceerd tot anatomische of aanvaardbare stand onder korte anaesthesie of sedatie met controle van beeldversterker. De gemiddelde opvolging bedroeg 24 maand (12-40 maand). Er was geen onmiddellijk postoperatieve mortaliteit, maar er was een 6 maand mortaliteit van 39%. Fractuurheling was de regel. De uitwendige fixatie bleef terplaatse gedurende gemiddeld 94 dagen (75-130) en werd ambulantly verwijderd op de raadpleging. Bij drie patiënten

werd een varus kanteling van meer dan 20° en een verkorting van meer dan 2 cm gevonden. Pin-tract infectie kwam voor rond 10 pinnen (7%). Geen enkel geval van osteomyelitis.

De behandeling van intertrochantere fracturen met een uitwendige fixator is eenvoudig, kan onder sedatie en lokale anesthesie. Vroegtijdige mobilisatie is mogelijk en verwijdering van de fixator is simpel. Voor de schrijvers is het een valabel alternatief bij hoog-risico bejaarden.

RÉSUMÉ

M. SUBASI, C. KESEMENLI, A. KAPUKAYA, S. NECMIOGLU. Traitement des fractures pertrochantériennes par fixateur externe.

Les auteurs ont étudié, chez 33 patients âgés en moyenne de 65,9 ans, les résultats du traitement par fixation externe de fractures pertrochantériennes du fémur. Il s'agissait de fractures pertrochantériennes stables de type Evans I ou instables de type I, qu'il était possible de réduire en position anatomique ou quasi anatomique par manipulation à foyer fermé sous contrôle radioscopique. Le suivi moyen a été de 24 mois (extrêmes : 12 et 40 mois). Il n'y a eu aucun décès dans le post-opératoire immédiat, mais la mortalité à six mois était de 39%. La consolidation complète a été obtenue dans tous les cas. Le fixateur a été enlevé en ambulatoire, en moyenne après 94 jours (extrêmes : 75 et 130 jours). Une désaxation en varus de plus de 20° et un raccourcissement du membre supérieur à 2 cms ont été relevés chez trois patients. Une infection s'est produite sur 10 broches (7%) mais n'a entraîné aucune ostéomyélite.

Le traitement des fractures pertrochantériennes par fixateur externe est simple et peut se faire sous anesthésie locale, sous couverture analgésique. Il permet la mobilisation précoce, l'ablation du matériel est aisée. Les auteurs considèrent que le fixateur externe est un traitement valable chez les patients gériatriques à haut risque.

EDITORIAL NOTE

At first look this is a disturbing approach to a common problem in the elderly, which seems to ignore the recent improvements in anaesthetic techniques, surgical skills and fixation methods.

Very often the mental condition of the severely ill elderly patient with a trochanteric fracture jeopardizes

the succesful application and continuation of external fixation throughout union.

After reading this article and surveying the scarce literature on the subject, the editorial board decided to publish this original study. Indeed, external fixation

might be the single possible solution for those rare patients that are considered unfit for open surgery with blood loss and prolonged anesthesia, keeping in mind the unavoidable pin tract complications and the occasional malunion.