CLOSED LOCKED INTRAMEDULLARY NAILING OF FEMORAL SHAFT FRACTURES IN THE ELDERLY

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ABSTRACT

A review was performed of all patients over the age of 60 years who were treated with a locked intramedullary nail for a femoral shaft fracture. There were 15 patients with 16 femoral shaft fractures. Four patients died perioperatively. Of the surviving 11 patients with 12 fractures, union occurred in 100 percent. Knee range of motion was greater than 100 degrees in 11 of the 12 knees. Nine of the 11 patients returned to their preoperative level of ambulation.

Intramedullary nailing of femoral shaft fractures in patients over the age of 60 years is an effective method of treatment. The mortality rate in elderly patients who sustain this injury is comparable to that seen after a femoral neck fracture in this age group.

INTRODUCTION

Intramedullary nailing has developed into a common method of treatment for femoral shaft fractures. Although a number of large studies have reported on the results of intramedullary nailing of femoral shaft fractures, few reports have concentrated on this form of treatment in the elderly population. Femoral shaft fractures are most commonly the result of high energy trauma in the young adult population, and therefore, little is known of the expected functional outcome after a femoral shaft fracture in the elderly. As our population ages, the incidence of femoral shaft fractures in older patients is likely to increase. Knowledge of the results of treatment in this age group is therefore important to the orthopaedic surgeon.

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Most of the literature on femur shaft fracture is predominantly in young patients. Most of the literature on elderly patients with femur fractures involve proximal femur of distal femur fractures and not femoral shaft fractures. Yet it is clear that femur shaft fractures do occur in the elderly and their outcome may very well be different from young patients with femur shaft fractures and different from elderly patients with proximal or distal femur fractures.

In order to better understand the problems associated with femoral shaft fractures in the elderly and to analyze their treatment with intramedullary nailing, we reviewed the results of all patients over the age of 60 years treated in this manner at the University of New Mexico Hospital for six consecutive years.

MATERIALS AND METHODS

A review of the medical records and radiographs of all patients over the age of 60 years who had a femoral shaft fracture treated with intramedullary nailing for six consecutive years was performed. Patients were excluded from the study if they had pathological fractures or a fracture about a prosthesis or implant.

Particular attention was given to survival rate, healing rate, the amount of knee motion, and the level of ambulation which was attained.

There were 15 patients with 16 femoral shaft fractures. This represented approximately 5% of the femoral shaft fractures treated with intramedullary nails during this same time period. The minimum length of follow up was six months (range six months to five years).

There were eight females and eight males. The average patient age was 72 years (range 62 years to 98 years). The mechanism of injury was a fall in seven, a motor vehicle accident in four, a pedestrian vs. motor vehicle in three, and a crush injury in one.

The fracture location was in the proximal shaft in eight, the middle shaft in seven, and the distal shaft in one. The amount of comminution was graded by the Winquist classification. Grade I comminution was present in six, grade II in two, grade III in six and grade IV in two fractures. The Singh index was used to give a determination of relative osteopenia. Grade VI bone trabeculae was present in zero, grade V in two, grade IV

in five, grade III in five, grade II in three, and grade I in zero patients.

The injury severity score (ISS) was determined for all patients. The ISS was less than 10 in eight patients, between ten and 20 in six patients, and greater than 20 in one patient.

TECHNIQUE

Closed reamed antegrade intramedullary nails were placed in all of the patients. The surgery was performed between zero and nine days from the time of injury.

General anesthesia was performed on all patients. A tibial skeletal traction pin was utilized, and the patient was then positioned on the fracture table. The supine position was used in 11 patients and the lateral position in four.

The skin incision began at the tip of the greater trochanter and was extended proximally. An awl was used to enter the intramedullary canal at the piriformis fossa, and reaming was performed over a guide rod which had been placed across the fracture site under fluoroscopic control. No fracture required an open reduction.

The diameter of the nail was 12 mm in one, 13 mm in three, 14 mm in eight, 15 mm in four. All patients had locking nails placed.

RESULTS

Four patients died in the perioperative period. One death occurred one month after the date of injury in a 72-year-old male with an injury severity score of 45 who had sustained multiple trauma, including a closed head injury after being struck by a car. One death occurred from cardiac failure in an 84-year-old woman three days after surgery. She had sustained a fracture from a fall and had a history of diabetes mellitus and coronary artery disease. One death occurred 11 days after surgery in a 68-year-old woman who had been struck by a car and who had an injury severity of 18. The cause of death is presumed to be from pulmonary embolism. The fourth death occurred from cardiac failure two weeks after surgery in a 98-year-old female who had sustained a fracture from a fall. This patient was a nonambulatory nursing home patient with a history of dementia and congestive heart failure.

Of the surviving eleven patients with twelve fractures, union occurred in 100 percent. No patient required reoperation to obtain union. There were no failures of the fixation, and fracture alignment was maintained in each of these patients.

The range of motion of the knee was 100 degrees or more in eleven of the twelve knees. One patient had only 90 degrees of knee motion present at three years follow up.

Before injury, all of the eleven surviving patients were independent community ambulators. After healing, nine patients returned to this level of ambulation, one patient required a cane, and one patient became nonambulatory secondary to a below knee amputation resulting from an open tibia fracture.

DISCUSSION

Femoral shaft fractures are usually the result of high velocity trauma and are more common in the younger population[6]. As our population ages, the incidence of femoral shaft fractures in the elderly is likely to increase.

There are few reports about this injury in elderly patients. In studies performed prior to the popularization of intramedullary nails, both Dencker and Hubbard were unable to show any benefit of operative fixation over traction in the treatment of femoral shaft fractures in the elderly[7, 8]. More recently, Moran et al reviewed the results of 24 patients who were over the age of 60 treated with an intramedullary nail[12]. They found this method of treatment to be effective in managing femoral shaft fractures, yet there was a 54 percent perioperative complication rate.

Local and systemic problems may compromise the results of fracture treatment in the elderly leading to increased morbidity and mortality. This has been well documented in the treatment of femoral neck fractures[2, 3, 4,5,9,11,16]. In addition, advanced age has a negative influence on the survival of trauma victims with similar injury severity scores[1, 13].

In our series, there was a 27 percent (4/15) mortality rate. Moran, et al reported a 17 percent mortality rate in their series of 24 elderly patients with femoral shaft fractures[12]. Most of the patients in that series had sustained their fracture from a simple fall. This rate of mortality is compatible with the rate reported in the elderly population who sustain a femoral neck fracture from a fall, but it is much higher than the rate reported in the younger patients with a femoral shaft fracture. In a prospective study by Bone et al on the results of operative stabilization of femoral fractures in patients less than 65 years old, only three deaths occurred in 83 patients who had an injury severity score of greater than 18, and no deaths occurred in 95 patients who had an injury severity score of less than 18[3]. Only one of the four patients who died in our series had a high injury severity score.

After femoral shaft fractures, (Jenkins et al and Brumback et al) reported loss of fracture fixation in elderly patients with osteopenia treated with intramedullary nails[4, 5, 10, 14]. While this remains a concern, in our study no patient experienced a failure of fixation or loss of reduction in spite of the number of individuals with

comminuted fractures and osteopenic bone. The use of large diameter interlocking nails is felt to have been beneficial in this respect. Four of the fractures in our series required a 15 mm diameter nail due to a relatively wide intramedullary canal, and previous studies have reported that elderly patients frequently benefit from a larger diameter nail.

The rate of union and the return of knee motion were similar in our series of elderly patients as has been reported in younger patients. In addition, the majority of our patients were able to return to their preoperative ambulatory status.

Few patients over the age of 60 with a femoral shaft fracture have been treated by methods other than intramedullary nailing at our institution. We therefore cannot comment on how this form of treatment compares with others. Based on our review, we feel that intramedullary nailing is an effective treatment for femoral shaft fractures in the elderly. It offers many of the advantages seen in the younger population. We caution, however, that the perioperative mortality rate may be similar to that seen after a femoral neck fracture in this age group[7, 8,9,15]. We are currently reviewing comparative efficacy of retrograde versus antegrade femoral nailing in the elderly population. With current trend toward smaller nails many sets do not have large diameter nails available. We are currently reviewing data to determine optimal diameter and the incidence of problems placing regular sized (12 mm) nails in patients with large (>16 mm) medullary canals.

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