INTRAMEDULLARY LOCKING NAILS FOR FEMORAL SHAFT FRACTURES IN ELDERLY PATIENTS

C. G. Moran, M. J. Gibson, A. T. Cross

From Sunderland District General Hospital

Fractures of the femoral shaft are generally considered to affect young patients, but we have reviewed 24 cases in patients over 60 years who have been treated by locked nailing, usually by closed methods. Most were women with low-velocity injuries, but despite this, 14 fractures were significantly comminuted.

The complication rate was 54% with a peri-operative mortality of 17%. Most complications were the general ones of operating on elderly patients. Specific complications included: fractures below an abnormal hip, proximal fracture related to the nail and poor purchase in the distal femur.

In all survivors, the femoral shaft fractures united satisfactorily, and the fixation allowed early mobilisation. The locking nail appears to be an effective method of managing femoral shaft fractures in the elderly patient.

Fractures of the femoral shaft are generally considered to be high-velocity injuries in young people (Mooney and Claudi 1984). Closed intramedullary nailing is an effective method of stabilisation (Winquist, Hansen and Clawson 1984). The introduction of the locked intramedullary nail has increased the number of femoral shaft fractures that can be treated by this technique (Küntschcr 1968; Klemm and Schellmann 1972; Kempf, Grosse and Beck 1985), and some authors now consider that it is the treatment of choice for all femoral shaft fractures in adults (Johnson and Greenberg 1987; Christie et al 1988).

In a recent review of femoral shaft fractures treated with a locked intramedullary nail, we noted that a significant number of patients were over 60 years of age. The difficulties in managing patients with femoral shaft fractures have not been documented in this age group. We now present the results and complications in 24 elderly patients who had locked intramedullary nailing for fresh femoral shaft fractures, and have paid particular attention to the technical difficulties.

PATIENTS AND METHODS

The Grosse–Kempf locking nail was first used at Sunderland District General Hospital in 1981, and since

Table 1. Grading of comminution in 14 fractures (Winquist et al 1984).

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<th>Grade</th>
<th>Number of fractures</th>
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<td>I</td>
<td>1</td>
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<td>II</td>
<td>2</td>
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<td>III</td>
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then 82 femoral nailings have been performed with this system. Of these, 24 (29%) were fresh fractures in patients over 60 years of age: these have been studied retrospectively.

The age of the patients ranged from 62 to 94 years (mean 77.3); there were 22 women and two men. One patient, aged 64 years, sustained a femoral fracture from a kicking horse, but the remaining fractures were the result of low-velocity injuries – usually a simple fall within the home. All fractures were unilateral and there were no significant associated injuries. The femoral fractures were in the proximal third in one patient, the middle third in 11 and the distal third in 12. Two were transverse, six oblique and two spiral, while, despite the low-velocity nature of the injuries, 14 showed significant comminution. The classification of Winquist et al (1984) was used to grade the comminuted fractures (Table 1).

All patients were placed in skeletal traction and had a careful pre-operative assessment. Fixation was then
performed during routine operating sessions, with an average delay before surgery of seven days. General anaesthesia was used for 22 patients and one patient had a spinal anaesthetic; there were no major anaesthetic problems. The average blood transfusion requirement was two units. The technique of nail insertion was that described by Kempf et al (1985), using a supine position on an orthopaedic table.

Closed reduction and nailing was performed in 21 cases. The fracture site was opened in three: one because closed reduction was impossible and two, with fractures below old pin and plates, because they required removal of metal. Once the guide-wire had been correctly inserted, reaming was usually easy; bone was often osteoporotic with a large intramedullary canal. The average size of intramedullary nail used was 380 x 14 mm, that is at least 1 mm wider than that usually inserted into young adults.

RESULTS

The results were good in most patients, with an average length of stay in hospital of only six weeks; most patients quickly regained their mobility. All the nails required locking at one or both ends. Three nails, for distal femoral shaft fractures, were left in a dynamic configuration proximally, being locked at their distal ends. In 21 patients the nails were statically locked at both ends. Eleven of these nails were dynamised at an average of 12 weeks after insertion.

It is difficult to be certain when a nailed femoral fracture has united. Indeed, this is not important, provided that the fracture consolidates before the implant breaks. For that reason the precise time to union cannot be given but the fractures all appeared to be uniting by 3 to 6 months. Callus formation around the fracture site occurred at least as quickly as would be expected in 'conservatively' treated fractures.

Mortality. Four patients died within 28 days of surgery, giving a peri-operative mortality of 16.6%. The cause of death was bronchopneumonia in two patients, pulmonary embolism in one and massive haematemesis from an acute peptic ulcer in the other. One other patient (85 years of age) who had been in long-term residential care, died from bronchopneumonia prior to discharge from hospital 72 days after operation, but this could not be related to either the surgery or the fracture.

General complications. Early postoperative complications were seen in 13 (54%) patients. Two developed wound infection, one superficial and one deep, but both responded to treatment with antibiotics without removal of the intramedullary nails. Two patients developed small decubitus heel ulcers. Urinary tract infection occurred in two patients after urethral catheterisation. Two patients with ischaemic heart disease developed congestive cardiac failure which responded to medical treatment.

Nailing complications. In five patients the femoral shaft fracture was associated with severe ipsilateral hip pathology: four had osteoarthritis (Fig. 1) and one had non-union of an old subcapital fracture. When limited hip adduction prevented normal positioning on the table, the nailing technique was modified (Fig. 2).

One patient with a markedly bowed femur needed a very small nail. By contrast two patients with comminuted distal shaft fractures required cement augmentation to improve fixation (Fig. 3). These patients had extremely soft, osteoporotic bone; cement augmentation was performed without opening the fracture itself. A cement gun was used: the tip of the gun was pushed through the soft, anterior cortex into the distal fragment of the femur. Under image intensifier control cement was then injected around the screws to improve their purchase. Vecsei expanding screws, which lock into the distal holes of the nail, have recently been introduced and are an alternative to cement augmentation.

Fig. 1
Ipsilateral hip disease did not preclude closed nailing.

Fig. 2
Position on the table modified for closed nailing of shaft fractures in patients with hip disease on the same side.

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Two patients sustained fractures of the femoral neck. In one an undisplaced intertrochanteric fracture occurred during insertion of the nail. The patient was managed conservatively and the fracture healed without complications. The second patient sustained a displaced basal subcapital fracture six months after insertion of the nail (Fig. 4). At the time of this injury the fracture of the femoral shaft had united. The nail was removed and the new fracture was treated with a long-stemmed bi-articular hemi-arthroplasty.

There were two malunions, one with 12° valgus angulation and one with 15° varus. They were both asymptomatic with no functional problems. In view of their age, and lack of symptoms, corrective osteotomy was not performed.

DISCUSSION

Femoral shaft fracture in the elderly patient is an injury to which little reference has been made in previous reports. In our series most patients were female (92%) and had sustained low-velocity injuries, usually from a simple fall within the home. These fractures pose certain problems. As a group they have much to gain from internal fixation and early mobilisation but, to be effective, the fixation provided has to be strong enough to allow early weight-bearing, even in poor quality, osteoporotic bone.

In our series, treated by intramedullary nailing, there was a complication rate of 54% and a peri-operative mortality of 17%. This is much higher than in other published reports of intramedullary nailing (Winquist et al 1984; Christie et al 1988), but these series were mainly of young patients. Most of our complications were not specifically related to the nailing, but reflected the general problems of operating upon elderly patients. Similarly all the postoperative deaths were due to the general complications of surgery, and similar morbidity and mortality would be expected if such patients had undergone operation for a fracture of the femoral neck (Ions and Stevens 1987).

We encountered a number of technical problems during closed intramedullary nailing. Five patients had their femoral shaft fracture below an abnormal hip joint. It was possible to perform closed nailing despite the gross lack of adduction: the patient was placed supine, the hip was flexed, the operating table was raised and the implant inserted in an upward direction. In two patients with comminuted distal shaft fractures, stable fixation in the distal fragment could not be achieved, despite the use of a 16 mm diameter nail with locking screws. Bone cement was inserted percutaneously, using a cement gun; this augmented the fixation and both patients made an uneventful recovery.

Another interesting problem was the incidence of proximal femoral fracture associated with Grosse-Kempf nailing. This occurred in two patients: in one, a
fracture of the trochanteric region appeared to have been sustained peroperatively. This may have been caused by an incorrect entry point for the nail, excessive force during insertion, or by completion of an unrecognised, pre-existing fracture line. The second patient developed a fracture at the base of the neck of the femur, six months after nailing of a segmental shaft fracture. This complication has not been reported before, although four cases of early subcapital fracture have been described (Christie and Court-Brown 1988). The proximal locking screw was still in situ when the patient fell, sustaining the neck fracture and breaking the screw. It may be that the implant acted as a ‘stress riser’ at a site where fractures are common. Only long-term review will show whether this is a major problem.

We conclude that the locking nail is an effective method of managing fractures of the femoral shaft in elderly patients, with a mortality and morbidity comparable with those for surgical treatment of fractures of the neck of the femur. Unfortunately the results of other methods of treatment for this age group are not available, so direct comparison is impossible. The major advantage of locked intramedullary nailing is that it provides immediate stable fixation which allows early mobilisation and rehabilitation.

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REFERENCES


