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INTERLOCKING NAILING IN TREATMENT OF DIAPHYSEAL FRACTURES OF FEMUR

Orthopaedics

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ABSTRACT

Forty Five fractures of femoral shaft were treated by interlocking intramedullary nail and followed for a period of 15 months. Union was achieved in 43 out of 45 fractures, 35 patients have shown good to excellent results. The complications seen included limb length discrepancy, medial mal rotation, infection and implant failure. Two patients developed Fat embolism syndrome, they improved subsequently.

KEYWORDS

Interlocking nail-femur

INTRODUCTION

Interlocking nailing owes its origin to the genius of Gerhardt Kuntscher, who pioneered femoral nailing and interlocking nailing in Germany in the 1940s, Since then, interlocking nailing has become widely used for the fixation of acute fractures of femur. This procedure has stood the test of time and has the following advantages; it is a relatively safe operation, the hospital stay is effectively reduced; both the general and systemic complications that may occur in the elderly are diminshed and the local complications like knee stiffness which can occur in all age groups are avoided by early mobilization.

The purpose of the present study is to report our experience with the forty five fractures of the femur that we treated with the interlocking nail.

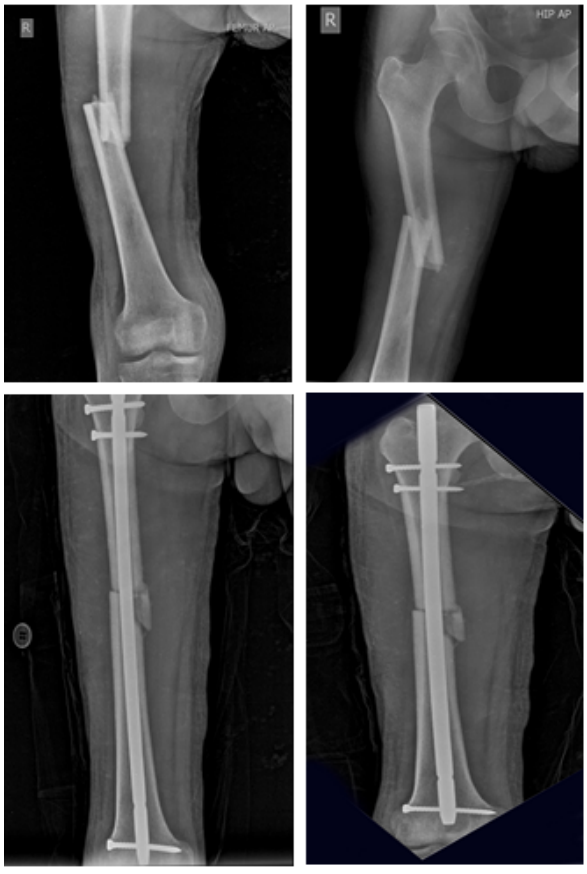
MATERIAL AND METHODS

Forty Five fractures of the femoral shaft (including five ipsilateral neck fractures) in 43 patients were treated with the interlocking medullary nail during the period of Jan. 2015 to May 2018. Thirty Five patients were males and eight females. The median age was 33 years (range nineteen to seventy years). Five patients had reconstruction nailing because of ipsilateral fracture neck of femur. Two patients had bilateral interlocking nailing on account of bilateral fracture shaft of femur. Eight cases had an associated fracture of tibia (5 ipsilateral and 3 contralateral). Ten cases were open fractures (Gustilo Grade 1, 7 cases and Gustilo Grade II, 3 cases). 28 fractures were high energy injury, mostly caused by road traffic accidents. Twenty five percent fractures were in upper third of shaft, sixty percent in middle third and fifteen percent fractures in lower third of the shaft of femur. 25 fractures were transverse or short oblique, 10 fractures were long oblique or spiral, 8 fractures were comminuted and two fractures were segmental. Prior to operation the patients were initially placed in skeletal traction. Any concomitant injuries were evaluated and treated in the accepted order of priority.

At operation, the patients were placed in supine position on a fracture table. Closed mailing was performed in 30 factures and open nailing was done in 15 fractures. Reaming was done in all cases. A maximum of 12 mm size reamer was used. In comminuted and segmental fractures only a limited reaming was done. The diameter of the nail chosen was always 1 mm less than that of the reamed canal. In 31 patients size 11 mm nail was used, in twelve patients size 10 mm nail was used two patients size 9 nail was used. Proximal locking was done using the target device provided by the system. Various methods that were used for distal locking were free hand technique with image intensifier, guiding systems, using same size nail and window. Kirschner wire method. Static locking was done in Forty fractures and dynamic nailing was done in five fractures. Median operating time was about 90 mins.

in thirty patients the operation was performed within the first week after injury. Rest of the patients were operated within two to three weeks after injury. Immediate weight bearing was not allowed in any patient. In 20 patients partial weight bearing was permitted after 2 weeks. In patients partial weight been was permitted after 8 weeks. Full weight bearing was permitted only after fourteen weeks.

The patients were followed for a median of 15 months post operatively. Union was achieved in all but two cases.



Pre-Operative & Post-Operative X-Rays

RESULTS

The results were designated as excellent, good, fair or poor according to the alignment of the fracture after union the range of motion of the ipsilateral knee and the degree of pain and swelling (Table I) Classification system used for the results of treatment was as given by Thoreson, et al.[1]

Table 1. Result

Results	No. of Patients
Excellent	20
Good	15
Fair	5
Poor	5

Complications

Limb length discrepency : Four cases had shortening ranging 1.5 to 4cms. All these four cases had more than 50% comminution at fracture site.

Malrotation **:** One case united in 20° internal rotation and another case united in 30° external rotation requiring removal of distal screw, correction of rotational deformity and reinsertion of the screw.

Infection : One case had superficial infection and two cases developed osteomyelitis which was later controlled by antibiotics.

Implant failure : In two cases nail broke, one at the fracturesite and the other from at distal screw hole. Size of nail was 9mm in both the cases. Renailing was done in both the cases using 10mm size nail.

Non-union : In 2 cases union could not be achieved and were treated later by renailing and bone grafting.

Two patients developed fat embolism syndrome requiring ICU care but recovered completely.

There was no incidence of sciatic, lateral popliteal or pudendal nerve palsy.

DISCUSSION

Femur has many characteristics that make it the ideal bone for intramedullary interlocking nailing. Excellent soft tissue envelope creates a protective sleeve, extensive vascularity enhances healing and the starting portal, the piriform fossa, is extra-articular thereby minimally damaging the hip joint. The correct starting portal is concentric to the endosteal canal in the antero posterior and lateral planes, therefore insertion of an intramedullary device proceeds easily. The starting portal and the subtrochanteric zone are in close relation to one another and make a straight line which also determines the axial alignment distal to subtrochanteric region.

The position of the patient can be supine or traditional lateral decubitus position. Lateral position allows easier access to piriform fossa and nail can be inserted through a relatively smaller incision but the whole setup is time consuming when using a fracture table and rotational alighment is difficult to asess. External rotational defornity is more likely. On the other hand in supine position although obtaining correct entry portal particularly is difficult in an obese patient but it facilitates assessment of rotational alignment and the insertion of distal locking screws is easier especially when using image intensifier. We have used supine position on spica table.

There is some debate whether a closed or open technique of nailing is the accepted method of treatment. Opening the shafts of long bones for fracture fixation has uniformly produced a high incidence of non-union, implant failure and infection.[2] In our series as some of the fractures were operated almost after 3 weeks of injury, the fracture were irreducible, so we had to resort to open technique (20 cases). Two of our cases developed osteomyelitis but were later controlled.

Descriptions of nail length in literature recommend that intramedullary nail should be inserted up to the end of the distal femoral epiphyseal scar.[3,4] Interlocking technique have obviated the need to insert the tip of the nail so close to the knee. Brumback[5] suggested inserting the nail to a level equal to the cephalad border of the patella, if the fracture pattern permits, which would place the interlocking screws cephalad to the level of the adductor tubercle. But if a distal fracture is being stabilized, adequate distal fragment fixation should not be sacrificed because of concerns about pain caused by screws.

As the reamed Kuntscher nails evolved into interlocking devices, the interlocking nails increased in strength relative to nail diameter and the interlocking screws obviated the need for extensive endosteal cortical contact as the basis for fixation. There is no longer any advantage to a larger diameter nail as device failure and loss of fixation occur only rarely with the stronger, interlocking intermedullary nails. Insertion of smaller diameter nails has permitted reduction in hospital inventories and accompanying decrease in costs. We have mostly used nails of 10 mm and 11 mm in diameter. We however always over reamed the canal by 1 to 1.5mm so that nail passes in with ease. We do not have any experience with unreamed nailing in femur. Conflicting evidence does exist in literature concerning beneficial or deleterious effects of reaming. Static interlocking leads to fracture union 98% of the time[6] Dynamization should be reserved for the small percentage of fractures that show no evidence of healing at a minimum of 3 to 6 months after injury. Recent studies have shown that in many cases only one distal interlocking screw needs to be inserted for most fractures. However two distal interlocking screws are recommended for fractures of intraisthmal and supracondyar regions.

Concerns about radiation exposure to the orthopaedic surgeons have lessened because several studies have measured radiation absorbed by the surgeon doing interlocking nailing and found the dose to an appropriately shielded surgeon to by very small.[7]

Ipsilateral fractures of the femoral neck and shaft are often difficult to diagnose and then to treat. Such fractures have been treated in past using various different modalities.[8]

All our cases of bilateral fracture shaft of femur (2) were operated in two sittings as the patients general condition did not allow a single sitting bilateral fixation.

We compared our series of 45 cases intramedullary interlocking nail of femur with those published earlier[9,10] and found our results comparable. Our complication rate was higher than most of them, probably because our learning curve is slow.

The natural history of femoral fractures treated with interlocking nailing is successful with high rates of fracture union and low incidence of infection, malunion, non union or implant complications. Problems encountered in femoral fracture treatment are moslty mechanical. If one can stabilize the femur in an acceptable position, then healing can be anticipated and a good functional result is likely.

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