

Original Research Article

A study on role of intramedullary interlocking nailing in the complex femoral shaft fractures

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Received: 12 June 2019

Revised: 22 July 2019

Accepted: 23 July 2019

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ABSTRACT

Background: Fractures of the shaft of the femur are a major cause of morbidity and mortality in patients who sustain high energy trauma. Morbidity arises from limb shortening, malalignment, knee contractures and other complications of fracture.

Methods: The aim of our study is to analyze the results of complex femoral shaft fractures treated by intramedullary interlocking nailing in our institution. Totally 20 cases of complex femoral fractures from 2007-2009 were treated with intramedullary interlocking at Krishanakumar Orthopedic Care Hospital, Nagercoil were included in our study.

Results: We found that fracture of femur is most common in 2nd, 3rd and 4th decade of life, with mean age of 35.85 years. Vehicular accident in 17 patients was observed to be the main cause of fracture in our series (85%). 4 patients started full weight bearing at 10th week, 9 patients were able to bear full weight at 12th week, 4 patients at 14th week and 2 at 16th week. Average time of full weight bearing was 12.4 weeks. One patient developed deep infection (osteomyelitis) at 12 weeks and later non union was seen and unable to bear full weight.

Conclusions: Intramedullary interlocking nailing for complex femoral fractures has been established worldwide as the gold standard treatment because of its load sharing property, internal splinting, and rotational stability. These contribute the stable osteosynthesis.

Keywords: Femur fracture, Interlocking nailing technique, Neurovascular damage, High-velocity injuries

INTRODUCTION

Fractures of the shaft of the femur are a major cause of morbidity and mortality in patients who sustain high energy trauma. Morbidity arises from limb shortening, malalignment, knee contractures and other complications of fracture.¹ Mortality is infrequent but can result from an open wound, fat embolism, adult respiratory distress syndrome or multiple organ failure especially in the polytrauma patients.² Both morbidity and mortality can be diminished by prompt reduction and internal fixation of the fracture.³ Restoration of alignment, rotation, and length, preservation of the blood supply to aid union and

rehabilitation of the patient is the goal of treatment.⁴ The type and location of the fracture, the degree of comminution, the age of the patient, patients social, economic demands and other associated fractures may influence the method of treatment.⁵ Currently intramedullary, interlocking nailing is considered to be the treatment of choice for complex femoral shaft fractures.

METHODS

Totally 20 cases of complex femoral fractures from 2007 to 2009 were treated with intramedullary interlocking at

Krishanakumar Orthopedic Care Hospital, Nagercoil were included in our study. Nineteen patients were male and one was female. The age group of these patients was ranging from 18-78 years.

Inclusion criteria

Inclusion criteria include complex femoral fractures in adults.

Exclusion criteria

Exclusion criteria include patients of all compound fractures, fractures in the pediatric and adolescent age group associated head injury, visceral injuries and old fractures.

Pre-operative protocol

All the complex femoral shaft fractures were examined thoroughly to look for associated injuries, neurovascular damage. A thorough examination of the ipsilateral hip and knee was performed. All the fractures were stabilized initially with Thomas splint, plaster immobilization, and pin traction. All patients were stabilized hemodynamically with intravenous fluids, blood transfusion as required. Radiographic evaluation is done by obtaining anteroposterior and lateral views of the femur, hip, knee as well as an anteroposterior view of the pelvis. The radiographs were critically evaluated to determine the associated comminution, the presence of the air in the soft tissue and the amount of fracture shortening. All the cases were operated in the regular operating table with image intensifier. 19 cases open nailing was done and for one case closed nailing was done. Proximal and distal locking was done with the jig or with the help of c-arm. Pre-operative and post-operative blood transfusion was done in all cases in relevant to blood loss.^{6,7}

Post-operative protocol

Drain removal on 48 hours. Static quadriceps exercises were started after drain removal. Early knee mobilization was encouraged after 48 hours as the patient tolerates pain. Non-weight bearing crutch walking was advised after suture removal. Partial weight bearing was advised after 4 weeks. Full weight bearing was advised after 12 weeks. All patients were followed regularly and clinical, the radiographic evaluation was done to assess the fracture healing.⁸

Statistical analysis

For statistical analysis, the chi square test were used, with a p value of less than 0.05 considered significant. The 95% confidence intervals were calculated with a statistical computer program, and interpreted as the range of values that has a 95% chance of including the true values.

RESULTS

There were nineteen males and one female patient, and the average age was thirty four years. Age group of these patients were ranging from 18-78 years. The fracture was right side in eighteen patients and left side in two patients. We found that fracture of femur is most common in 2nd, 3rd and 4th decade of life, with mean age of 35.85 years.

Table 1 shows vehicular accident in 17 patients was observed to be the main cause of fracture in our series (85%). In our series 1 patient had associated head injury with healing time of 17 weeks, 1 had abdominal injury with healing time of 19 weeks and 7 patients had associated fractures, with mean healing time of 19.7 weeks. Middle third (11 patients) of the shaft femur was found to be the most frequent site of fracture (55 %). Five patients had fracture in L\3rd (i.e., 25%) and 4 fractures were of U\3rd (i.e., 20%).

Table 1: Mode of injury.

Mode of trauma	No. of patients	%
Vehicular accident	17	85
Fall	2	10
Agricultural sector	1	5
Sports injury	0	0

Table 2 shows in 10 patients with excellent results there was no shortening, malalignment, no pain or swelling in the fracture site and movements of the hip, a knee was near normal. In 5 patients with good results had shortening of 1 cm and knee flexion of 120°. In 3 cases with fair results had limb shortening; and knee flexion of between 90°-120°. In 2 cases of with poor results had limb shortening of 2 cm and knee stiffness. The range of movements of knee less than 90°. All the patients had fractures of both bone leg and that could be the cause of knee stiffness. In our study seventy five percent had knee flexion more than 120 degrees and had good functional outcome.

Most of the cases operated earlier and post-operative knee mobilization, quadriceps exercises were started on second post-operative period and had good results. 10% of cases had associated ipsilateral fracture both bone leg and had poor knee flexion with average of 92 degree and these patients had poor fair result.

Table 2: Comparison of outcome after surgery.

Results	N (%)
Excellent	10 (50)
Good	5 (25)
Fair	3 (15)
Poor	2 (10)

DISCUSSION

Fractures of the shaft of femur usually a result of high energy trauma and accompanied by severe injuries to another organ system.⁹ The therapeutic goals in the treatment of this fracture are the avoidance of cardiopulmonary problems, prevention of infection, early mobilization and functional rehabilitation of the limb.^{10,11} Fracture to be united when there is no tenderness or pain during weight bearing and when there is radiographically bridging callus with cortical density connecting three segments. Intramedullary interlocking nailing has proved to be an effective method in the treatment of the complex fracture shaft of the femur in adults.¹² Since the femur is surrounded by muscles and excellent soft tissue coverage, the destruction of endosteal blood supply due to reaming does not impede the fracture healing.¹³ The intramedullary interlocking nail acts as an internal splint and provides rigidity and rotational stability. Segmental fracture of the femur is an unusual injury caused by a severe force and associated with marked damage to the soft tissue, especially quadriceps muscle.¹⁴ Since the patient who incurs this type of fracture frequently have associated multiple injuries, stabilization of patient is the first objective in treatment, but the two subsequent goals, bone union despite diminished vascularity and restoration of function despite excessive soft tissue damage.¹⁵ In segmental fractures union of the distal segment is delayed in some cases. In our study one patient had a delay in fracture healing in the distal fragment to which bone grafting was done. The vascular supply of the distal segment is reduced in the segmental fractures. Therefore the healing of the distal fragment is usually slower.¹⁶ Weight-bearing has been widely used to promote fracture healing. Dynamization promotes the union of fracture site in 50% of delayed union cases.¹⁷ Early bone grafting yield 100% fracture union. The use of plate to achieve osteosynthesis of segmental fractures necessitates a wide operative exposure and excessive stripping of soft tissues resulting in increased blood loss and long operating time. The risk of infection and the delayed union is increased and the failure of the plate is also common.¹⁸ Due to the high rate of complications associated with this type of fixation, most of the traumatologists have advocated intramedullary interlocking nailing is the gold standard treatment.¹⁹ Use of fracture table is associated with pudendal, sciatic, femoral nerve palsies due to traction or direct pressure. In addition compartment syndrome in the good leg and crush, syndromes have been documented with the use of fracture table and probably caused by intraoperative positioning.²⁰ Our study consists of 19 cases of complex femoral fractures were treated by the open interlocking nailing and one case by closed nailing. The mean duration between the injury and surgery is higher in our institution (average 17 days) due to patient reporting to our hospital after native treatment, nonavailability of operating room time due to the long waiting list, and associated co-morbid conditions. This longer duration between the time of injury and surgery is accounted for the difficulty in fracture reduction with the

consequent opening of the fracture site. The patient who had close nailing showed early fracture union in 20 weeks and functional outcome was excellent.²¹

CONCLUSION

Our study consists mostly of male patients in their active part of their life. So, there is a need for a quick return of their daily routines. Intramedullary interlocking nailing for complex femoral fractures has been established worldwide as the gold standard treatment because of its load sharing property, internal splinting, and rotational stability. These contribute the stable osteosynthesis. When the patients are taken up for surgery earlier, fracture reduction can be achieved by a closed method and yield early fracture union, excellent functional outcome, and prevention of complications. Early mobility, a low rate of complications and high incidence of union obtained in this study in the majority of patients makes this technique more reliable.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Kumaran V, Sachidhanandham. A study on role of intramedullary interlocking nailing in the complex femoral shaft fractures. *Int J Res Orthop* 2019;5:843-6.