

SURGICAL MANAGEMENT OF DIAPHYSEAL FEMORAL FRACTURES WITH INTERLOCKING NAIL

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ABSTRACT: Diaphyseal fractures of the femoral shaft are one of the common fractures treated by the orthopaedic surgeons. Most of these fractures are a result of road traffic or the industrial accidents and the victims usually are young adults, predominantly males. The treatment of diaphyseal fractures of femur in adults is mainly surgical. The internal fixation devices as well as the operative methods have evolved over the time. Lately, Interlocking nail has been extensively used for the treatment of these fractures with excellent results. A study comprising of thirty patients with diaphyseal femoral fractures treated with interlocking nail is presented. Twenty six patients were males and four were females. Average age was 38.5 years. Twenty four patients had fracture in the middle 3rd. Eighteen patients had comminution of varying degree. Twenty six were close and four open fractures. Twenty two fractures were operated within 3 days. One patient had fat embolism, two patients had superficial infection at distal locking site, one patient developed medullary osteomyelitis. There were three delayed unions, four malunions and one nonunion. The results of the present study were comparable to other national and international studies. The study re-emphasizes the fact the interlocking nail is the treatment of choice for diaphyseal fractures of femur.

INTRODUCTION: Diaphyseal fractures of the femoral shaft are one of the common fractures treated by the orthopaedic surgeons. Industrialization and accelerated travel has led to increase in the number and severity of accidents. Since Femur is the principle load bearing bone of the lower limb, femoral diaphyseal fractures are associated with considerable morbidity and mortality. The treatment of diaphyseal femoral fractures has evolved from the historical non operative treatment to the recent technique of interlocking nailing. The art of fracture management is to balance the need for early mobilization and functional use of extremity with maintenance of satisfactory length and alignment of fracture. Early mobilization following fractures of the femoral shaft has been shown to have a significant advantage in terms of both joint mobility and economic impact (Whittle AP. Fracture of the lower extremity In: Canale ST, Beaty JH, editors, Campbell's operative orthopedics. 11th ed. Philadelphia: Mosby publishers; 2008. p. 3190-217). Depending on the level, pattern, and soft tissue damage, various methods of management like external fixator (NK Aggarwal, IntOrthop. 2007 June; 31(3): 409-413), various types and combination of plates and screws (Reimer BL et al, Orthopedics. 1992 Aug; 15(8):907-16.), intramedullary devices like kuntscher nail (Kuntscher G: the method of intramedullary fixation. JBJS 40A: 17:1958) and interlocking nail have been described.

MATERIAL AND METHODS: Thirty cases of diaphyseal femur fractures were managed with interlocking nail. There were 26 males and 4 females. The average age of the patients was 38.5 years. Twenty six patients had close fractures, four patients had open fractures, of which three patients had Guistilo and Anderson grade I, 1 had grade II fractures. Fractures in proximal 3rd were present in 4

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patients, middle 3rd in 24 and distal 3rd in 2 patients. Fracture patterns were 9 transverse, 1 spiral, 2 oblique and 18 comminuted. Twenty two patients were operated within 3 days .Delay of 6-10 days in 6, 11-15 days in 2 patients was mainly due to associated other major injuries, fat embolism or other comorbidities. Twenty three patients had reamed and 7 patients had unreamed nailing. After initial resuscitation in the emergency, the closed fractures were splinted, and operated at the earliest. The open fractures were thoroughly lavaged, debrided and covered with a sterile dressing and splinted in the emergency operation theatre. Tetanus prophylaxis was given in all the patients. Intravenous antibiotics were started in all open fractures and continued as the wound condition necessitated. In patients with associated life threatening head, chest or abdominal trauma, fractures were splinted and patient followed on regular basis and operated once fit to undergo operative intervention. All the nailings in closed fractures were done on a fracture table in supine position. Traction was applied through a distal femoral or proximal tibial skeletal pin. For radiographic imaging, C- arm was used. Proximal lockings were done through jig and distal lockings were done by free hand technique. Antibiotic cover with a second generation cephalosporin for 48 to 72 hours was given. Open fractures were treated with thorough lavage and debridement before nailing. Mobilization in form of range of motion and quadriceps were started in bed and patients were allowed partial weight bearing with walker once quadriceps control was gained. Patients were discharged after suture removal on 10th day post-surgery. They were followed in orthopaedic OPD where they were assessed clinically and radiographically on 15th ,45th and 60th day and then on two monthly basis till the union, keeping in view the rate of healing of fractures, function of the limb and complications.

OBSERVATIONS: Patients were assessed clinically and radiographically and all the complications were noted and categorized into early and late complications. All complication arising within 6 weeks of surgery were regarded as early and thereafter were regarded as late complications.

Early complication: One patient had fat embolism, he was initially managed in a high dependency unit under the care of a physician. Fracture was stabilized with skeletal traction. He recovered and was taken up for surgery after a period of 12 days. One patient had post operative haemorrhage from the entry site. He needed the cauterization of the offending bleeder. One patient developed infection of the compound wound for which debridement and intravenous antibiotics according to the culture sensitivity were started, he developed associated intramedullary infection which went on to become chronic. Two patients with open fractures developed superficial distal locking site infection, these resolved with intravenous antibiotics. There was distraction at fracture site in one patient for which early dynamization was carried out

Late complications: One patient had chronic intramedullary infection. Debridement for the chronically discharging sinus was done, although the fracture united, the infection did not resolve and he was still having chronically discharging sinus at the last follow up. Three patients (two closed and one open fractures) had delayed union and required bone grafting. Malunion was present in two patients. Nonunion was present in one patient, for which exchange nailing and bone grafting was done and the fracture united. Two patients had malunion. Shortening was present in two patients. There was malrotation at the fracture site in two cases. Knee stiffness was present in 4 patients. Heterotopic ossification around the entry site was present in 1 patient.

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DISCUSSION: Ever since G. Kuntscher published his text of "Practice of intramedullary nailing" in 1940s, intramedullary nailing has evolved through the years to reach the present state of the art, creating new standards of care for fractures of the long bones. In their study of femoral nailing J Christie et al, 1988, reported a mean age of 33 years; Rober A winquist, 1984 reported a mean age of 29.5 years. We observed an average age of 38.5 years. Donald A Wiss, 1995 observed a sex ratio of 5.16:1; S Venkat et al, 1997, observed a sex ratio of 1.7:1; in this study sex ratio of 6.5:1. was observed. Donald A Wiss, 1986 while reviewing 112 femoral fractures reported associated injuries in 58% of his patients. Howard et al (1990) in a series of 98 patients, 53 had multiple injuries. In this study associated injuries were found to the tune of 57%. Venkat et al, 1997 while reviewing complications of interlock nailings in 200 femoral fractures observed 176 closed fractures and 24 open fractures, Guistiolo and Anderson Grade I in one, gr II in 8 and gr III in 5 patients. In the present series it was observed that 26 (86.6%) patients had close and 4(13.3%) patients had open fractures, of which three patients had Guistilo and Anderson grade I, 1 had grade II fractures. Robert Winquist 1984 in a series of 520 femoral fractures observed, 261 comminuted fractures, 101 short oblique, 30 spiral, 26 segmental fractures. In this study, it was observed that 9(30%) fractures were transverse, 1(3.33%) spiral, 2(6.66%) oblique, and 18(60%) were comminuted. Most common site of fractures was in the middle 3rd accounting for 80%of diaphyseal fractures which compares well with the studies of Baixauli et al, 1998 and Venkat et al, 1997. Twenty two patients in this study were operated within three days, in 8 patients surgery was delayed because of associated injuries, fat embolism or other co morbidities. Baixauli et al, 1998, in a series of open femoral fractures reported an average delay of 11 days (range 3-22 days). Venkat et al 1997 reported an incidence of fat embolism of 0.5-2%, Channa et al 1998 reported an incidence of 4%, this study reported an incidence of 3.3%. In this study infection was present in three patients .Superficial locking site infection was present in two patients and intramedullary infection was seen in one patients. Venkat et al, 1997, reported an overall incidence of infection in 11 cases with two superficial and nine deep infections with 2 cross screw and 7 deep nail infections in 200 interlock nailings of femur. Channa et al 1998 reported an incidence of infection in 4% patients. Johnson et al, reported 13% incidence of infection following open intramedullary nailing.

Late postoperative complications of persistent deep infection in one case (3.33%) were observed in the present study. Deepak M.K et al, 2012, in his 30 cases reported infection in five out of thirty cases. Haque M.A et al, Mymensingh Med J, 2009 reported infection in 3% of his cases. Malunion was seen in 2(6.66%) patients, one in distal 3rd fracture with inadequate fixation and one in subtrochanteric comminuted fracture which united in varus. Delayed union was seen in 3(10%) and nonunion in 1(3.33%) patient. Venkat et al, reported malunion in 5.5% of his patients, delayed union in 2.5% and nonunion in 7.5% of his patients. Haque M.A et al, 2009, in his sixty cases reported an incidence of nonunion in 2%. Winquist et al, 1984, reported an incidence of nonunion in 0.9%, infection in 0.9% and shortening in 7.1%. In this study knee stiffness was present in 4 patients (13.3%). This was either because the limb was in traction because of delay in surgery or the patient had ipsilateral other injuries. Heterotopic ossification at entry site was seen in 1(3.33%) patient, Venkat et al reported an incidence of 1%. There was no case of implant failure. Venkat et al 1997 reported an incidence of broken nails in 3%of his patients and cross screw breakage in 2.5% of his patients.

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CONCLUSION: Intramedullary nails have advantages, like maintaining the anatomical length and alignment of comminuted fractures, being a minimally invasive fixation it results in high union rates. Locked Intramedullary fixation provides strength for femoral shaft fracture in bending, compression, and torsion. It leads to early joint mobilization and early muscle tissue recovery and rehabilitation, shortened hospital stay, and reduces the incidence of complications like infection and cortical stress shielding.

It is found that the results of this study are comparable with the other international and national studies and it validates the fact that locked intramedullary nailing is gold standard in the treatment of diaphyseal fractures of the femur.

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