

# Management of Type-II Open Fracture Shaft of Femur with Intramedullary Interlocking Nail

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## ABSTRACT

- Objective** To find out frequency of fracture healing with the use of interlocking intramedullary nailing in type-II open fracture shaft of femur.
- Study design** Descriptive case series.
- Place & Duration of study** Orthopaedic Surgery, Unit I Civil Hospital, Karachi, from August 2009 to August 2010.
- Methodology** Sixty-five patients who sustained type-II open fracture of shaft of femur, were selected. All patients underwent fracture stabilization by locking intramedullary nail. The main outcome measure was fracture healing (i.e. callus formation) on x-ray at six months of follow-up. The SPSS version 13 was applied used to analyze data.
- Results** Majority of the patients (44.6%) were between 18-30 years of age. Males were affected more than females with male to female ratio of 4:1. Road traffic accidents were responsible for these fractures in 73.8% of cases. Healing (i.e. callus formation) was achieved in 61(93.8%) patients radiographically at the end of six-months. Mean time to union was 18.5 weeks.
- Conclusion** Intramedullary interlocking nail was safe and effective in the management of type-II open fractures of femur shaft with excellent healing rates.
- Key words** Interlocking nail, Intramedullary nail, Femur, Open fracture shaft femur.

## INTRODUCTION:

Femoral shaft fracture is amongst the most common fractures encountered in orthopaedic practice. Fractures of the shaft of femur are a major cause of morbidity and mortality in patients with lower extremity injuries.<sup>1</sup> They can be life threatening due to fat embolism, adult respiratory distress syndrome or resultant multiple organ failure.<sup>2</sup> Even with survival after initial trauma, disability usually results from femoral shortening, fracture mal-alignment or prolonged immobilization of the extremity. Femur is one of the principle load bearing bones in the lower extremity. Open fractures shaft of femur are produced

by high energy trauma like road traffic accidents, fall from height, assaults, gunshot injuries and industrial accidents.<sup>3</sup>

The annual incidence of open fracture of femur is estimated to be approximately 5 per 100,000 persons.<sup>4</sup> Various classification systems have been proposed but the most widely used is that of Gustillo and Anderson which describes three groups of increasing severity based on the size of open wound, degree of its contamination and the extent of soft tissue injury and type III injuries are further classified into three subgroups based on the extent of bone exposure, requirement of adequate soft tissue cover of the exposed bone and the need for vascular repair.<sup>3</sup>

The goal of treatment in open fractures is to prevent infection, and restore normal limb length, alignment and function. Various treatment modalities have been used to treat these fractures with intramedullary

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nailing offering a load bearing-device with excellent stability against the axial and rotational deformation of the fracture.

These fractures may also be treated by traction alone, traction followed by a standard cast brace or external fixation, or open reduction and internal fixation with plates and screws.<sup>5</sup> Most fractures are sustained in young adults due to high-energy injuries.<sup>6,7</sup> In 1907 and 1909, Steinmann and Kirschner respectively developed the first traction treatment modalities with the use of pins or wires under tension.<sup>8</sup> However, treatment of diaphyseal femur fracture became revolutionized when Modney first described intramedullary nailing in 1953.<sup>9</sup> The rationale of this study was to analyze the effectiveness of intramedullary interlocking nail in the management of type II open fracture of femur in terms fracture healing.

**METHODOLOGY:**

This study was conducted in Orthopaedic Unit I, Civil Hospital Karachi from August 2009 to August 2010. Patients between the age of 18-60 year, either sex with Gustillo type-II open fracture of shaft femur were included in this study. Patients were admitted through Accident and Emergency department and from OPD. Initial evaluation and adequate resuscitation was done according to the principles and guidelines of ATLS protocol. Concomitant serious and possibly life threatening injuries were excluded. Neurovascular status of the limb was carefully evaluated. Open fractures were assessed and categorized according to Gustillo and Anderson classification.<sup>10, 11</sup>

Wounds were covered with sterile dressing. Injection tetanus toxoid, broad spectrum antibiotics, usually first generation cephalosporin, and parenteral analgesic were given. X-rays in anteroposterior and lateral planes including hip and knee joints were obtained. Fractures were immobilized by Thomas’s splint. After 48 hours re- debridement, if needed, was done. After proper counseling and informed consent fractures were fixed with interlocking intramedullary nail under image intensifier. Static quadriceps exercises were started on first post-operative day and patients were mobilized with crutches. Antibiotics, usually were given for three to four days depending upon condition of wound. Patients were discharged from ward on 4<sup>th</sup> or 5<sup>th</sup> post-operative day, depending upon condition of wound. Stitches were removed in OPD on 14<sup>th</sup> post-operative day. Partial weight bearing was started after 3 to 4 weeks of surgery. Follow-up was done with x-rays in OPD every four weeks for six months. Union was assessed clinically and radiologically.

Dynamization was done in cases when callus formation was not satisfactory, usually 8 to 10 weeks post-operatively. Full weight bearing was started once callus was visible on x-rays. Data management and analysis was done using SPSS version 13.0.

**RESULTS:**

During the study period 65 patients sustaining type-II open fracture of femur shaft were identified who fulfilled the inclusion criteria. Final outcome of the treatment were evaluated using modified Klaus Klemencriteria.<sup>11</sup> Majority of the patients were between 18 to 30 year of age. Eleven cases (16.9%) were between 41 to 50 year of age. Seventeen cases (26.9%) were of 31 to 40 year and eight (12.3%) cases were between 51-60 year of age. Fifty two (80.0%) patients were males with male to female ratio was 4:1.

Fifty-three patients sustained right femur fracture while in twelve left femur was injured. The mechanism of injury was road traffic accident in 48 (73.8%) patients and fall from height in 17(26.2%) patients. Four patients developed superficial wound infection, which was treated by dressing and antibiotics. None of our patients developed deep infection (table I).

<b>Complications</b>	<b>No of patients</b>
Infection superficial	04 (6.15%)
Stiffness knee joint	03 (4.61%)
Delayed union	02 (3.09%)
Non-union	04 (6.15%)
Shortening	01 (1.53%)
Angular deformity 5-10 <sup>0</sup>	03 (4.61%)

Mean time to union was 18.5 weeks. In two patients delayed union occurred after four months of follow up. In both the cases dynamization and bone grafting was done and union was achieved in six months. In three cases there was stiffness of knee joint which was treated by physiotherapy and normal range of motion achieved. There was no breakage of nail or screw in our series. In four cases union did not occur in six months of follow up (table II).

**DISCUSSION:**

There is considerable debate regarding the best method of treatment of open fracture femur. The treatment of open diaphyseal fracture femur has

**Table II: Final Outcome**

Result	No of patients	Percentage
Excellent	35	53.84
Good	20	30.76
Fair	06	9.23
Poor	04	6.15

evolved over the years. Various techniques have been described for early fracture stabilization in literature.<sup>5</sup> The intramedullary nail is a load sharing device, allowing early mobilization of patients, joint mobility and early discharge from hospital. In this study, 70.7% of the affected patients were between 18 to 40 year of age group, mean age was 30.55 year. Umer et al noticed average age of 36 year in their case series, which is comparable to results of this study.<sup>12</sup> The male to female ratio 4:1 in this study was also in keeping with other reports.<sup>13,14</sup> Grosse et al also showed involvement of 93(86.5%) men and 15(13.5%) women in their study and this further emphasizes the greater vulnerability of males to trauma.<sup>15</sup>

In our series 73.8% sustained fracture as a result of road traffic accidents as reported by others.<sup>6,11</sup> In this series 4 cases (6.1%) developed superficial infection. Sardaretal<sup>1</sup> reported 9.1% infection.<sup>16</sup> In our series shortening less than 2cm was noted in one patient, whereas in other series similar findings were reported.<sup>12,17,18</sup> We noted angular deformity of 5-10 degree in three cases, whereas Amjad et al reported no rotational deformity in their series.<sup>18</sup> In this study, delayed union was noted in 2 (3.6%) cases, the frequency of which varies in literature.<sup>12</sup> Deepak has reported 6.6% delayed union in their series.<sup>11</sup> We managed delayed union by dynamization and bone grafting and achieved union in both cases.

Locked intramedullary nail fixation has become the standard treatment for all categories of femur shaft fracture with reported union rates between 88-100%.<sup>15,19,20</sup> The results of current study revealed that adequate callus formation was achieved in 93.7% of cases after interlocking intramedullary nail. Shafi and colleagues encountered 94% of union rates in patients treated by interlocking intramedullary nail for femoral shaft fractures.<sup>21</sup>

### CONCLUSION:

Intramedullary interlocking nail was safe and effective treatment for type-II femur shaft fractures because of excellent healing rates.

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