

# Results of Early Interlocking Intramedullary Nailing in Fractures of Femoral Shaft

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## ABSTRACT

**Objective** To determine the results of early intramedullary fixation in closed and grade 1 open fractures of the femoral shaft in terms of patient compliance rehabilitation and complications

**Design** descriptive cross sectional study.

**Place of study** Department of Orthopaedic Surgery Jinnah Hospital Lahore from January 2010 to January 2011.

**Materials and methods:** 40 patients having closed and grade 1 open fractures of the femoral shaft who presented in the accident and emergency department were included in the study. In all patients the fractures were managed by static interlocking intramedullary nailing after reaming of the medullary cavity. The average stay of the patient in the hospital was 4 days. At each follow up, the patient were assessed for the parameters like knee range of movements, fracture healing, return to independent ambulation, complications and need for any additional procedure. The data regarding these parameters for each of the patient was analysed statistically to ascertain the success of the procedure.

**Results:** The ages of the patients ranged from 15-50 years. The modes of injury were road traffic accidents, fall from height or direct trauma. 25 had closed fractures and 15 had grade 1 open fractures. Time to radiological union was 18-24 weeks with an average if 22 weeks. Time from bed to chair movement to toe touch ambulation to full weight bearing was 10-18 weeks with an average of 14 weeks. Patients who complied strictly with the rehabilitation had knee range of movement 0-120 degrees on average only 5 patients had knee range of movement from 0-90 degrees .Only 2 patients developed superficial infection which was successfully treated by antibiotics.

**Conclusion:** Closed intramedullary nailing is a far better option for the treatment of fractures of the femoral shaft. Not only is it associated with less morbidity but due to less surgical dissection and considerably better and rigid fixation , the patients satisfaction is also good, there is less incidence of infection, shorter duration of hospital bed occupancy and far better outcomes of the rehabilitation efforts.

**Key words:** Static interlocking, intramedullary, reaming

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## INTRODUCTION

Femoral shaft fractures are the most common of the long bone fractures<sup>15,19,20,21</sup>. Increasing frequency of traffic accidents has considerably increased the incidence of femoral shaft fractures<sup>17,18</sup>. In Pakistan due to poor literacy rate and disappointingly poor facilities in government hospitals almost 60% of such patients prefer treatment from local bone setters. Only 40% are brought to a hospital and most of these hospitals lack the facilities for proper and early treatment for such fractures. Interlocking intramedullary nailing requires the use of image intensifier (fluoroscope) which is not available in all hospitals. Delay in the treatment of such injuries not only increases the risk of complications but also leads to growing patient concerns regarding

treatment, prolonged hospital bed occupancy, choice of inferior treatment option and so, difficulty in patient's rehabilitation<sup>4</sup>. Intramedullary nailing for the treatment of femoral shaft fractures has been in practice since 1921 when Hey-Groves inserted the first intramedullary nail in femur during world war I<sup>16</sup>. Over the years improved nail design and use of metallic alloys and insertion techniques with use of fluoroscope has made it by far the best option in treatment of femoral shaft fractures in comparison with compression plates (DCP)<sup>5,6</sup> and prolonged immobilization in traction beds.

In 1970 Klemm and Shellman designed and inserted a clover leaf nail in femoral shaft fractures<sup>13</sup>. This nail included an oblique proximal and two transverse distal holes for interlocking screws. Improved nail design and introduction of radiographic image intensifier have broadened the applicability of intramedullary nailing.

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The aim of this study was to assess the effectiveness of closed intramedullary fixation of femoral shaft fractures by static locked nails in terms of it being a superior and faster method of fixation with better patient compliance and rehabilitation and lesser complications.

## MATERIALS AND METHODS

It was a descriptive cross sectional study carried out in the department of orthopaedic surgery Jinnah hospital Lahore, Pakistan from January 2010 to January 2011. A total of 40 patients, age 14 to 50 years with closed and grade 1 open fractures of middle and distal 3<sup>rd</sup> fractures of the femoral shaft were selected. Gender was not considered factor for suitability. Only patients with single bone fractures who had presented within 24 hours of the injury were selected (Table 1).

Patients younger than 14 years, patients with already infected wounds, with preexisting deformities of bones and or any other skeletal injury were excluded from study. Each patient was fully explained regarding the surgery the cost of implant and future rehabilitation and informed consent was taken. All baseline blood investigations CBC, ESR, biplane full length radiographs of both femori with AP and lateral projections and hip and knee of the affected side were taken. X ray and ECG was done of all patients above 40 years of age. The approximate nail length and diameter were calculated using the radiographs.

During surgery patients were placed in supine position and both feet were fixed to the foot plate of the traction table. An oblique supratrochanteric incision was made and after dissection of subcutaneous tissue and muscle, the piriform fossa was approached and with help of bone awl the medullary cavity was opened. A small diameter hand reamer was used to gain proper access into the cavity. Guide wire was inserted across the fracture under fluoroscopic control. This required external manipulation at the fracture site. Guide wire was pushed upto 4cm above the knee joint. Cannulated cavity reamers starting from the lowest diameter were threaded over the guide rods and reaming of the cavity was started. Reaming of the cavity was done upto 1mm higher than the measured cavity diameter at the isthmus. A nail of the measured length and diameter was assembled and inserted over the guide rod into the cavity and impacted. The guide rod was removed and using flouroscope the distal locking screws were localized and drilled with drill bit and appropriate length self tapping screws inserted. Back strokes were used to impart compression at the fracture site if required. Then proximal locking screws were inserted. The wounds were closed in layers

over suction drain after copious irrigation with N/saline and an aseptic dressing was applied. prophylactic antibiotics were given for 3 days as per hospital policy. Drain was removed on the 3<sup>rd</sup> post of day and patient was discharged with instructions of non weight bearing ambulation with crutches. Patients were followed up in the out patient department every 3 weeks with biplane radiographs. At each follow up, the patient were assessed for the parameters like knee range of movements, fracture healing, return to independent ambulation, complications and need for any additional procedure. The data regarding these parameters for each of the patient was analysed statistically to ascertain the success of the procedure (Table 2).

## RESULTS

Out of 40 patients in 20(50%) age range was between 20 –40 yrs.10 patients were aged above 40 yrs and 10 patients were 15-20 years old (25%). The mode of injury in 30 patients was road traffic accidents.10 patients fell from a height and 2 were injured by direct trauma. Out of the 40 patients included in the study, 30 patients had midshaft fracture(75%) and 10 had fractures of distal 3<sup>rd</sup> of femoral shaft (25%). 25 patients had closed fractures and 15 had grade 1 open fractures (Gustillo Anderson). All patients underwent closed, interlocked, intra-medullary nailing within 24 hours of injury. Time to radiological healing was 18-24 weeks with an average of 22 weeks. Time from toe touch ambulation to full weight bearing was 10-18 weeks with an average of 14 weeks. Pain and mobility are primary factors as far as functional recovery is concerned. In our study 5 patients developed joint stiffness with knee ROM <0-100 degree (12.5%). This was due to lack of rehabilitation facilities available to these patients. Post operatively only 2 patients developed superficial infection at site of distal locking screw which was successfully treated with oral antibiotics.

Table 1: Year wise frequency of femoral shaft fractures presenting in accident and emergency department.

Year	No of patients on average weekly basis	No of patients with fracture shaft of femur	%age
2003-2004	17	01	5.8
2004-2005	21	03	14.2
2005-2006	22	07	31.8
2006-2007	27	11	40.7
2007-2008	30	12	40
2008-2009	22	10	45.4
2009-2010	23	11	47.8

Table 2: Comparison of various parameters in interlocked nailing vs dynamic compression plating in femoral shaft fractures

	Interlocking nailing	Plate fixation
Average duration of hospital stay	3 days	4 days
Bed to chair movement	5 days	26 days
Knee range of motion exercise	7 days	18 days
Toe touch ambulation with crutches	15 days	40 days
Assisted full weight bearing	18-20 weeks	36-40 weeks

## DISCUSSION

Intramedullary nailing has revolutionized the way long bone fractures are being treated. One of the primary advantages of intramedullary nailing is that it can be used as a closed technique<sup>1,2</sup>. Low infection rates and less joint stiffness have been reported using intramedullary nailing techniques compared to open methods<sup>6</sup>. This device is a load sharing device allowing early patient mobilization<sup>7</sup>. Reaming of the medullary cavity allows osteoinductive, osteoconductive and osteogenic material to enter the fracture site and this also leads to good fracture healing without disturbing the fracture haematoma<sup>22</sup>. Closed, interlocked, intra medullary nailing has therefore become the standard treatment in cases of long bone fractures<sup>11</sup>.

The femoral shaft fractures are common in all age groups however, young males are affected more commonly<sup>3,8,9</sup>. Majority of our cases are due to road traffic accidents. Closed fractures are encountered more commonly compared to open fractures. Post operative infection can be minimized by efficient prophylactic measures including pre-operative antibiotics, aseptic technique, proper sterilization, good quality implants and proper wound care<sup>23</sup>.

Time to full weight bearing depends on fracture geometry, rehabilitation and patient compliance<sup>10,12,24</sup>. On average our patients were full weight bearing at 14 weeks. Lack of awareness, cost and difficulty in transportation and hospital expenses are all factors for poor outpatient follow up of patients especially in our socioeconomic setup. Patients who become pain free and ambulant do not follow proper instructions and may have complications.

## CONCLUSION

On basis of our study we recommend that all tertiary care hospitals of major cities of Pakistan should have facility for early closed intramedullary fixation of femoral shaft fractures. Fluoroscopes should be present in the accident and emergency department

so that such long bone fractures can be fixed as early as possible and major complications associated with prolonged hospital stay, immobilization like deep vein thrombosis, bed sores can be prevented.

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