



E-ISSN: 2395-1958  
P-ISSN: 2706-6630  
IJOS 2021; 7(1): 154-156  
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[www.orthopaper.com](http://www.orthopaper.com)  
Received: 05-11-2020  
Accepted: 14-12-2020

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## Operative outcomes of antegrade intramedullary interlock nailing in femoral shaft fracture: A study of 30 cases

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**DOI:** <https://doi.org/10.22271/ortho.2021.v7.i1c.2474>

### Abstract

Femoral shaft fractures are one of the most common injuries. These fractures are often associated with polytrauma and commonly result from high energy mechanisms such as motor vehicle collisions with sequelae of limb shortening and deformities, if not treated appropriately. Intramedullary nailing is an effective method of treating femoral shaft fracture and has become one of the preferred procedures in orthopaedics. The present study attempts to clinically evaluate the outcomes of antegraded intramedullary nailing in shaft femur fractures.

**Materials and Methods:** 30 patients with shaft femur fracture were studied with the minimum 12 months of follow up. Functional outcome was assessed by Thoresen's criteria.

**Results:** Out of 30 patients excellent functional status was seen in 76.6%, good in 13.33%, fair in 10% whereas there were 0% patients falling under the category of poor functional status. **Conclusion:** Intramedullary nailing is effective treatment for the stabilisation of the fracture shaft of femur. Femur interlocking nail is a good implant for the treatment of femoral shaft fractures because of its load sharing, closed insertion, rotational stability, restoration of anatomic length alignment and early mobilization.

**Keywords:** Fracture shaft of femur, intramedullary nailing of femur, antegrade nailing

### Introduction

Femoral shaft fractures are one of the most common injuries. These fractures are often associated with polytrauma and commonly result from high energy mechanisms such as motor vehicle collisions with sequelae of limb shortening and deformities, if not treated appropriately. Femoral shaft fractures typically occur in a bimodal distribution, high-energy trauma in the young population, and lower energy trauma in the elderly population [1]. The worldwide incidence of femoral shaft fractures ranges between 10 and 21 per 100,000 per year. Two percent of these fractures are open fractures [2, 3]. Men are more likely to sustain a fracture between the ages of 15 to 35 while women begin to show a steady increase starting at age 60.

Intramedullary nailing is an effective method of treating femoral shaft fracture and has become one of the preferred procedures in orthopaedics. It is associated with high union rates and low complication rates. Intramedullary nailing can be antegrade and retrograde nailing, antegrade nailing has two approach piriformis fossa and a trochanteric. Several factors must be taken into account that include the particular fracture characteristics, associated Musculo-skeletal and/or visceral injuries, patient body habitus, associated local soft-tissue injury, and the technical familiarity of the surgeon with each nailing method [4].

Antegrade IM nailing through the piriformis fossa is associated with healing rates as high as 99% and with low complication rates. The colinear trajectory with the long axis of the femoral shaft is the main advantage of this approach. With the trochanteric approach the entry is through the tip of the greater trochanter for nail insertion introduced by Küntscher. The risk of iatrogenic fracture comminution and varus is less with piriformis approach than the trochanteric approach. Retrograde nailing is an alternative to antegrade nailing. Early studies of retrograde nailing have revealed that non-union rates are greater than antegrade nailing also complications of knee have been seen after retrograde nailing [5, 6, 7].

The present study attempts to clinically evaluate the outcomes of antegraded intramedullary nailing in shaft femur fractures.

**Materials and Methods**

In this study 30 patients with shaft femur fracture were studied with the minimum 12 months of follow up. Inclusion criteria for the study was patients with > 20 years of age presenting with fresh shaft femur fracture and open graded shaft femur fracture whereas the exclusion criteria for the study were children with femoral shaft fracture in whom growth plate is still open, patients with pathological fractures, patients with poor skin conditions around shaft femur, patients managed conservatively for poor general medical conditions, patients lost in follow up and neurovascular compromised femoral shaft fractures.

**Operative Procedure**

The patients falling into the inclusion criteria were taken in the study. The patients were positioned supine over radiolucent fracture table after giving spinal anaesthesia. The incision was made 10- 12 cm proximal and 3-4 cm inferiorly to greater trochanter and the entry was made through the piriformis fossa with the help of the entry awl and the guide wire was passed up to the distal femur maintain the reduction of the fracture with manual traction and manipulation. While maintaining the reduction under the guidance of image intensifier with the help of flexible reamer, reaming was done.

Reaming was done 0.5 mm extra compared to the intended diameter of the nail to be used. Kirschner wire joystick manure or bone hook were used in the patients in which reduction was not achieved by manual traction and manipulation. Then while maintaining the reduction, proper sized nail was inserted with the help of the jig which was further fixed by 4.5mm locking bolts after drilling with 4 mm drill bit under guidance of image intensifier. Then after giving proper saline wash, wound closed in layers.

**Post-operative care**

Proper intravenous antibiotics were given till post-operative day 5 along with analgesics. Patients were closely monitored for compartment syndrome and low molecular weight heparin were given whenever indicated. Post-operative weight bearing protocol was changed according to the fracture pattern. On follow up visits weight bearing was decided on the basis of callus formation. Weight bearing was delayed in the unstable fracture fixation until proper callus formation is noticed, where in stable fracture patterns weight bearing was started early, to be initiate with partial weight bearing.

**Evaluation**

Patients were evaluated by post-operative standard antero-posterior and lateral femoral x-rays of the operated limb and were assessed by Thoresen’s criteria at 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> post-operative months.



Fig 1



Fig 2

**Fig 1, 2:** Pre and post-operative X-ray

**Results**

Total 30 patients were taken into this study. Mean age of the patients was 35.70 years, youngest in our study is 22 years of age and the oldest is 58 years of age. About 26.67% patients were in the age group of 21-30 years, 40% were in age group of 31-40 years, 20% were in the age group of 41-50 years and the remaining 13.3% were in the age group of 51-60 years of age. Out of 30 patients, 21 patients (70%) were males and 9 patients were females (30%). 19 patients (63.3%) had right side femur fracture and 11 patients (36.7%) had left side femur fracture. Road traffic accident was the commonest mode of injury (73.3%) of cases followed by fall from height (16.7%). Superficial infection was seen in 2 patients (6.67%) delayed union seen in one patient (3.33%), malunion in two patients (6.66%) and fatb embolism seen in one patient (3.33%).Restriction of hip range of motion was seen is 2 patients (6.67%) and restriction of knee range of motion was seen in one patient (3.33%). Seven patients (23.3%) were full weight bearing within 2-3 post-operative days, 17 patients (56.7%) started full weight bearing at 2-3 weeks, whereas 6 patients (20%) started full weight bearing after 2-3 months. Average radiological union time was 12-14 weeks in 10

patients (33.3%), 16-19 weeks in 16 patients (53.3%), 20-23 weeks in 1 patient (3.33%) and more than 24 weeks in 1 patient. 3 (10%) patients underwent dynamization.

**Table 1:** Complications in our study

Complication	Number of patient	percentage
Superficial Infection	2	6.67%
Deep Infection	-	-
Delayed Union	1	3.33%
Malunion	2	6.67%
Non-union	-	-
Implant breakage	-	-
Iatrogenic neck femur fracture	-	-
Fat embolism	1	3.33%

**Table 2:** Thoresen’s Criteria in our study

Result	Number of patients	Percentage
Excellent	23	76.67%
Good	4	13.33%
Fair	3	10%
Poor	0	-
Total	30	100%

## Discussion

Antegrade interlock nailing for diaphyseal femoral fractures has been conventionally done using piriformis entry portal. The main advantage of piriformis entry point its collinear alignment with the long axis of the femoral shaft which reduces the risk of iatrogenic fracture comminution and varus malalignment compared to off-axis entry points such as trochanteric entry points. The main disadvantage of piriformis entry point include relative technical difficulty obtaining the proper entry site especially in obese patients and relative longer operative time. Mean operating time was 114.8 minutes. Functional status assessment was done using Thoresen's scoring system. Excellent functional status was seen in 76.6%, good in 13.33%, fair in 10% whereas there were 0 % patients falling under the category of poor functional status. Two patients in this study had malalignment, one of them had to undergo plating. None of them had pain. No case was reported with shortening which is very low compared to GROSS and Kempf<sup>8</sup> where 11(21.1%) patients out of 52 had shortening.

## Conclusion

The fractures of the shaft of femur are commonly seen in the adult male population with Road traffic accidents. The main advantage of piriformis entry point its collinear alignment with the long axis of the femoral shaft which reduces the risk of iatrogenic fracture comminution and varus malalignment compared to off-axis entry points such as trochanteric entry points. There is a direct relationship of the diameter of the nail used and length of the nail used to the fracture union. Bigger the diameter and more the length used for nailing the fracture union is early.

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