



A STUDY OF 30 CASES OF PRIMARY INTERLOCK NAIL FIXATION FOR FRACTURE SHAFT FEMUR

Orthopaedics

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ABSTRACT

INTRODUCTION: The femur is the strongest bone in the body. Femoral shaft fractures are one of the common injuries encountered in orthopaedic practice. Fracture femur results from the drawbacks of fast life and violence more frequently as a result of road traffic accidents. They are major source of mortality and morbidity in patients with such injury.

OBJECTIVES: The purpose of this study was to assess the results of IMN surgery in adults in the fracture of the femoral shaft by open and closed methods.

MATERIALS AND METHODS: This prospective study was carried out between November 2014 and November 2017 in Tertiary care institute. Antegrade nailing using the Standard intramedullary interlocking nail was performed on 30 cases who presented with shaft fractures of the femur. These cases of fracture shaft femur were treated by nailing. Data was collected from the patients attending the orthopedic department with fracture shaft of femur and satisfying the inclusion criteria.

RESULTS: The common age group was ranging from 18 to 35 yrs. 24 patients were males, 6 were females. 23 patients had closed fracture, 3 had Gustillo Anderson Grade I compound and 4 had Grade II open fracture. In 10 patients fracture was at M/3rd, in 11 patients it was at L/3rd level and in 9 patients it was at U/3rd level. 4 patients were operated by open interlocking nail and other 26 by closed technique using C-arm. Injury surgery interval was 6.20 days on an average. Mean hospital stay was 12.16 days (5-34 days). Range of knee flexion was full in over 90% of cases, 8% showed knee flexion from 0-120 degree and 2% showed 0-30 degrees of knee flexion. Mean time for union was more in patients treated by open procedure (20 weeks) as compared to closed technique (18.35 weeks) so full weight bearing was earlier and were in more patients in whom closed method was applied as compared to open method ($p < 0.005$). We found 2 patients developed superficial infection, which healed completely none had deep infection.

CONCLUSIONS: Interlocking intramedullary nailing is a very effective and successful method of definitive primary treatment, in most types of fractures of the shaft of the femur. Interlocking nail is effective in controlling rotational and longitudinal forces that act across the fracture site.

KEYWORDS

Femur interlock nail; Shaft femur

INTRODUCTION

The femur is the strongest bone in the body. Femoral shaft fractures are one of the common injuries encountered in orthopaedic practice. Fracture femur results from the drawbacks of fast life and violence more frequently as a result of road traffic accidents. They are major source of mortality and morbidity in patients with such injury. They can be life threatening, because of open wounds, hemorrhagic shock, fat embolism, ARDS or multiple organ failure. Femoral fractures are challenging problems to treat, as there is usually comminution at the fracture site and associated soft tissue injuries. In addition, there can be difficulty in assessing malrotation at the fracture site. Patients who have low mineral density got their shaft fractured even by low energy trauma.¹⁻⁶ The art of femoral fracture care is a constant balancing of the often conflicting goals of anatomical alignment and early functional rehabilitation of limb. The treatment of femoral shaft fractures still remains a problem, and a subject of controversy among orthopaedics surgeons. Knowing the advantages and disadvantages of different modalities we can reduce the morbidity, disability and period of stay in the hospital.¹⁴ Intramedullary fixation has gained wide acceptance, in the treatment of femoral shaft fractures. Orthopaedics surgeon comes across the complications of delayed union or nonunion following intramedullary nailing.⁷⁻¹⁵ Orthopaedic Trauma Association (OTA1996)¹⁵ have classified femoral shaft fractures into three main types (simple, wedge, and complex). The femoral shaft fracture in multiply injured patient can be stabilized temporarily with an external fixation, and later with an intramedullary nailing.^{18,17}

Interlocking nails is the accepted means of treatment for most complex femoral shaft fractures (Severely comminuted, oblique and spiral fractures) as well as for the fractures complicated by loss of bone and metaphyseal fractures. Interlocking nails are available in various designs to serve many purposes. Today the most common method for femoral nailing is to place a cannulated nail.²⁰

AIMS AND OBJECTIVES

The purpose of this study was to assess the results of IMN surgery in adults in the fracture of the femoral shaft by open and closed methods.

MATERIALS AND METHODS

STUDY DURATION & SAMPLE SIZE:

The present study was carried out between November 2014 and November 2017 in Tertiary care institute. Antegrade nailing using the Standard intramedullary interlocking nail was performed on 30 cases who presented with shaft fractures of the femur. These cases of fracture shaft femur were treated by nailing. Data was collected from the patients attending the orthopedic department with fracture shaft of femur and satisfying the inclusion criteria.

TYPE OF STUDY: Prospective study

CRITERIA FOR PATIENT INCLUSION:

- All shaft femur fracture (including comminuted & segmental fracture)
- Age > 18 yrs
- Closed & Open Grade I, II

CRITERIA FOR PATIENT EXCLUSION:

- Age group < 18 yrs
- Grade-III Gustillo Anderson compound fracture
- Associated with Head / chest / Abdomen injury / other limb injury
- Pathological Fractures, Fracture Non-Union & Delayed Union
- Patient not willing or medically unfit for surgery

METHODOLOGY:

After clinical assessment of signs and symptoms, x rays and pre-operative investigations were done. After prior informed consent, a pre-operative anesthetic evaluation was done, pre-op planning of fixation was made and nail length was measured on opposite thigh. Under anesthesia, closed reduction and internal fixation with intramedullary interlocking nails done using c-arm.

TYPE OF NAIL:

The type of nail which was locally available and with proximal locking jig and two proximal and distal holes.

POST-OPERATIVE PROTOCOL:

Post-operatively mobilized without weight bearing on 2nd to 4th day, patients were advised active quadriceps exercises, Hip and knee flexion-extension exercises. Suction drain if used, was removed after 48 hours and sutures were removed on 12th to 15th post operative day. Partial weight bearing was started at 6weeks. Full weight bearing was possible by 8-12 weeks depending on the fracture configuration, callus response.

FOLLOW UP:

Follow up was carried out at 6, 10, 14 weeks and 6 months. At the follow up patients were examined regarding pain, implant impingement, deformity tenderness, range of movement at hip and knee joint, ability to bear weight, sitting cross legged and any other complication. Radiographs were taken at different interval periods.

Dynamisation was considered after 12 weeks, when radiological gap was seen between the fracture fragments.

RESULTS

The common age group was ranging from 18 to 35 yrs. 24 patients were males, 6 were females. 23 patients had closed fracture, 3 had Gustillo Anderson Grade I compound and 4 had Grade II open fracture. In 10 patients fracture was at M/3rd, in 11 patients it was at L/3rd level and in 9 patients it was at U/3rd level. 4 patients were operated by open interlocking nail and other 26 by closed technique using C-arm. Injury surgery interval was 6.20 days on an average. Mean hospital stay was 12.16 days (5-34 days). Range of knee flexion was full in over 90% of cases, 8% showed knee flexion from 0-120 degree and 2% showed 0-30 degrees of knee flexion. Mean time for union was more in patients treated by open procedure (20 weeks) as compared to closed technique (18.35 weeks) so full weight bearing was earlier and were in more patients in whom closed method was applied as compared to open method ($p < .005$). We found 2 patients developed superficial infection, which healed completely none had deep infection.

In our series of 30 patients functional evaluation was done using Thoresen et.al. classification system according to that 25 patients had excellent results, 4 patients had good results, 1 fair results and 0 poor results.

AGE DISTRIBUTION

Age Group	No of patients	Percentage
18 – 35	20	67%
36 – 50	3	10%
>50	7	23%

So the max incidence were seen between 18 to 35 years of age group.

Distribution According To Gender

Male	Female
24 (80%)	6(20%)

Male are more in compare to female

INVOLVED SITE

Right	Left	Bilateral
16 (54%)	13 (43%)	1 (3%)

More number of patients sustained the fracture of right femur

RATIO OF CLOSED TO OPEN FRACTURES

Closed	Open
23 (77%)	7 (23%)

Details of open fractures according to gustilo and Anderson's classification

Open type 1	Open type 2	Total
3	4	7

Patients were seen more with classification type 2

Anatomical Level Of Fractures

Upper /3	Middle/3	Lower/3
9 (30%)	10 (33%)	11 (37%)

There is no correlation in anatomical level.

According To Fracture Patterns

Transverse	Oblique	Spiral	Comminuted	Segmental
19 (63%)	2 (7%)	2(7%)	6 (20%)	1 (3%)

The most no of patients are seen are with the transverse fracture.

Shortening	Superficial Infection	Deep Infection	Non union	Stitch Line necrosis	Implant failure
13%	6.66%	-	-	-	3%

Shortening remained a major complication in present study.

END RESULTS

Excellent	Good	Fair	Poor
25 (83%)	4 (13%)	1 (4%)	0

Around 96% patients had excellent to good results.

DISCUSSION

The treatment of fracture diaphysis of femur has evolved from the old conservative management to the most recent methods of interlocking nails. This is the era of biological fixation. Interlocking nails have greatly expanded the indications for closed IM nailing of femoral fractures. The rationale for internal fixation is that it restores the anatomical alignment and allows early mobilization of the patient and limb. The use of a plate to achieve osteosynthesis necessitates wide operative exposure and excessive soft tissue stripping, resulting in increased blood loss and operating time. The risk of infection is increased. Failure of the plate is common and the need for primary bone grafts adds additional morbidity to the procedure. Early mobilization following fractures of the femoral diaphysis has been shown to have a significant advantage in terms of both joint mobility and economic impact which has very well attained by the use of interlocking nails.

In mid-shaft fractures one screw proximally and one distally is adequate. Proximal and distal third fractures of femur are prone for malalignations. IM nailing allows early mobilization with minimal scarring of thigh musculature and early functional recovery; early weight bearing with minimal scarring can be expected with intramedullary nailing. Rapid mobilization leads to economic benefits to the patient. Enormous complications have been cited in the literature for intramedullary nailing.²⁰ In a systematic overview by (Bhandari, 2000) 7% non union rate was reported.²¹ But in our study the rate of nonunion was 0%, this is due to better treatment strategy and careful selection of operative procedure and surgeon's experience.

The earlier healing time with close nailing in our series could be attributed to non disturbance of the fracture haematoma. Pati et al reported similar union rate. The time for union is a very controversial topic. It is not possible to assess healing of fracture by usual orthopaedic

criteria. Since after operation, stability is obtained immediately and patient becomes pain free in the ensuing 3-4 weeks. Time to healing could not be assessed accurately either clinically or radio logically since such large intramedullary nails were used. Clawson et al have reported an average time for appearance of bridging callus at 6 weeks with partial obliteration of fracture site as the time of union.²² Rokamen et al have used the time elapsing between the accident and ability to walk without stick and return to work as the criteria for the progress of fracture healing.²³ In this study nature of bridging callus with partial obliteration of fracture site has been used as time for union. Assessment on return to work cannot be taken as a sign for progress of fracture healing since the majority of patients involved in the present series

are usually heavy manual laborer who require solid union before they can go back to work in contrast to the western countries where patients usually have sedentary jobs and hence can be put to work earlier as compared to a manual laborer. The open IL nailing with a predictable surgical time procedure is less expensive, easy and more convenient for less experienced newly qualified orthopaedic surgeon, only fewer instruments are required. Due to the direct observation of bone may lead to absolute anatomic reduction which cannot be possible with close IL procedure particularly in comminuted and segmental fractures. In comparison to the

closed method, rotational mal-alignment is rare after open reduction.

In non unions opening of the medullary canals of the sclerotic bone is easier, and it required simultaneous bone

grafting can be considered. But surgical skin scar, increased blood loss, loss of fracture haematoma (which is more important in fracture healing) increased infection rate, and complication rate particularly in comminuted fracture and decreased rate of union has its own demerits in open IL nailing procedure.

AVERAGE TIME FOR UNION

Series	Average union in weeks
Present	18 (14 -28)
Robert J. Brumbark (1988)	19 (4-51)
Philip D. Hajek (1993)	12 (8 -26)

Average time of union was around 18 weeks.

AVERAGE SHORTENING

Series	Shortening in centimetres
Present	1 (0.5 -1)
Robert J. Brumbark (1988)	1.5
Philip D. Hajek (1993)	0.8

Average shortening of the femur in the present series was around 1 cm.

CONCLUSION

Closed Intramedullary interlocking nailing is a very effective, successful and time tested method of treatment for diaphyseal fractures of femoral shaft because of Stable fixation, Faster rate of fracture union, Lower rate of complications like infection or non-union and Allows early mobilization & return to routine activities. Interlocking nailing gives rotational as well as axial stability and should be given chance for diaphyseal femur fracture treatment whenever possible.

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