e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(8); 1413-1419

Original Research Article

A Study of Management of Diaphyseal Fractures of Tibia by Closed, Reamed Interlocking Nail

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Received: 25-06-2023 / Revised: 30-07-2023 / Accepted: 22-08-2023
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Conflict of interest: Nil

Abstract:

Background and Objectives: Many patients come to Department of Orthopaedics with tibial fractures. It is one of the common injuries occurring in adult age group. Though fractureunites with conservative treatment but associated with high morbidity. So fractures stabilization with intramedullary interlocking nail is useful to prevent morbidity. We aim to study efficacy of intramedullary interlocking nail in the treatment of closed tibial fractures.

Methods: A total of 30 patients with closed tibial fractures underwent surgery for the fracture fixation with intramedullary interlocking nail in the Department of Orthopaedics, BMIMS Pawapuri. Study duration of Two Years. Patients were selected irrespective of sex.

Results: Excellent results were obtained in 76.7% of cases, good results in 16.7%, fairin 10%. Complications include 6.7% of superficial infection, 6.7% of Anterior Knee pain.

Conclusion: Intramedullary interlocking nail is the reliable, versatile and effective treatmentfor closed tibial fractures. The advantage of rapid rehabilitation and relatively few complications serves to recommend this procedure.

Keywords: Intramedullary Interlocking Nail, Rehabilitation, Complications.

Introduction

Fracture shaft of tibia is one of the common fractures encountered by the orthopaedic surgeons in their daily practice, this is because the bone is subcutaneous with less protection from the surrounding muscle. Over the years various modalities of treatment has been used. Now a days the well laidprinciple of biological osyteosynthesis rightly applied in long bone fracture healing and hence the selection of closed intra- meduallary interlocking nailing in this study.

Both operative and non-operative treatments of tibial shaft fractures have been strongly advocated. less severe fractures gradually do well without surgery, the more severe fractures requires surgery. Closed interlocking nailing helps in faster healing of fractures, because the fracture haemotoma is not disturbed and also the periosteal callus formation is not disturbed. Now with better operative technique and with availability of the image intensifier interlocking nailing became the accepted mode of treatment for closed diaphysealfractures of tibia and majority of open fracture.

Interlocking intramedullary nailing of the tibia greatly improves rotational stabilityand can be used for axially unstable fractures located from 7cm below the knee jointto 4cm above the ankle joint[1]. Intramedullary nails with interlocking capabilities were developed in an effort to provide a more stable fracture construct and to expand the spectrum of fractures that could be nailed while avoiding the complications of malunion[2].

Objectives

- To maintain limb length and prevent shortening
- To study fracture healing and the union rate with intermedullary interlockingnailing.
- To prevent angulation and deformity.
- To evaluate the functional outcome and to compare with other worker studyseries

Materials and methods

All confirmed cases of fracture shaft of tibia in Department of Orthopedics of BMIMS Pawapuri, Bihar, Study duration of Two Years. was taken up for the study. 30 cases including both males & females were studied. Cases were also followed up at an interval of 6 weeks, 3 months and 6 months which extended. Incidence rate of fracture shaft of tibia due to RTA is 37.5% (Rockwood Greens Fractures in adults 5th edition. Vol 2) at a permissible error 35%. Size of sample works out to

be 30 using statistical formula n=4pq/l2.

Inclusion criteria

- Patient who has been diagnosed as fracture shaft of tibia.
- Age group of more than 20 years of either sex.
- Patient who are fit for surgery.

Exclusion criteria

- Skeletally immature individual.
- Gustilo – Anderson classification of open fractures of shaft of tibia Type III.
- Neurovascular injury
- Pathological fracture.
- Nonunion

Segmental fracture: Patients were selected on the basis of History, clinical examination and radiography.X – Ray of full length of tibia- antero-posterior and lateral view was taken. All fractures were classified as per Orthopedic Trauma Association (OTA) AO classification of tibial diaphyseal fractures & these were treated with intramedullary interlocking nail. Follow up and assessment were performed using JOHNER AND WRUTH< S CRITERIA.

Preoperative preparation of patients

- Patients were kept NBM for 8-10 hours before surgery.
- IV fluids as per the need were given.
- Adequate amount of compatible blood if needed was arranged.
- Preparation of whole extremity, private parts and back was done.

Preoperatively the length of the nail is calculated by subtracting 3 to 4cm frommeasurement taken from the knee joint line to tip of the medial malleolus clinically and medullary canal is measured at the isthmus on X-rays. Accordingly, a stock of interlocking nails 2cm above and below the measured length and 1mm above and below the required diameter were always kept. We have used cannulated tibial nails inour cases. Patients were operated under spinal / general anesthesia. Patient was placed in supine position over a radiolucent operating table. The injured leg was positioned freely, with knee flexed 90º over the edge of operating table to relax the gastro-soleus muscle and allow traction by gravity.

Postoperative Care:

Immediate:

- NBM 4-6 hours postoperatively
- IV fluids/ blood transfusion if necessary
- IV antibiotics: In most of the patient's injection cefotaxime andinjection gentamycin were used for 5 days followed by oral antibiotics.

IM analgesics: Patient was allowed non-weight bearing with crutch walking / walker on next postoperative day according to the general condition and tolerance of patient. Skin sutures / staples were removed on 10th - 12th postoperative day.

Depending upon the culture report and wound condition antibiotics were stopped/continued. Partial weight bearing with crutch walking /walker commenced after 10 days, depending upon the type of fracture, rigidity of the fixation and associated injuries.

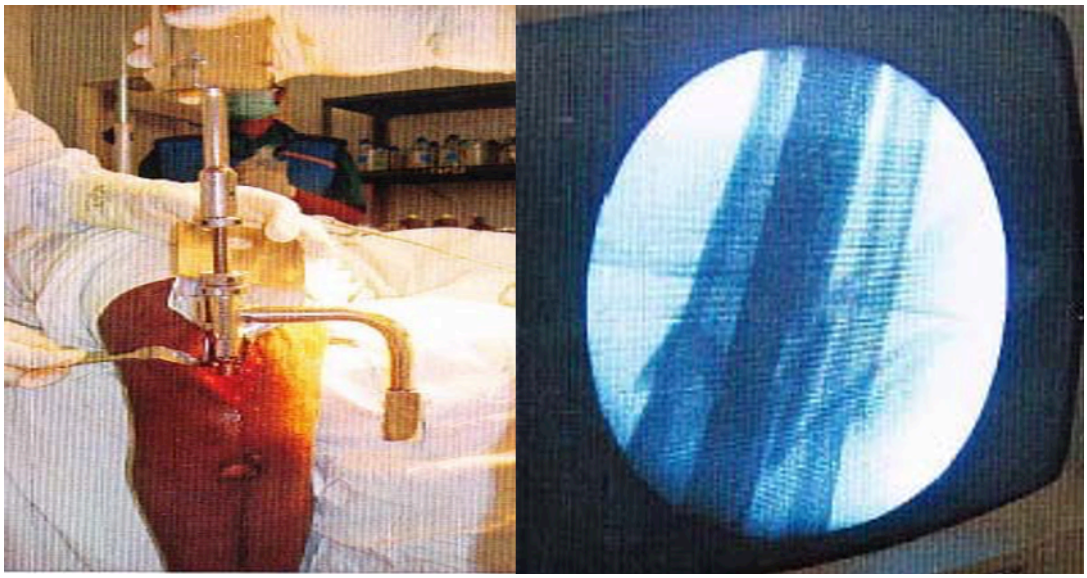


Figure 1: Nail been inserted Nail positon confirmed in c-arm

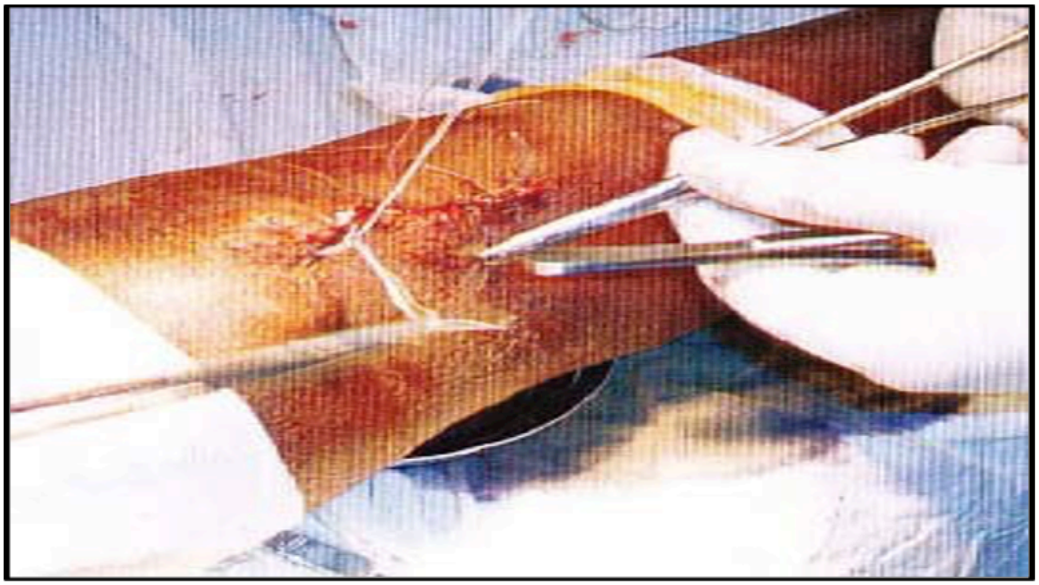


Figure 2: Closure of Wound

Results: 30 patients with fracture shaft of tibia were treated with closed interlocking nailing.

Table 1: Age wise Incidence:

Age	No. of patients	Incidence
20-30	17	56.67%
31-40	8	26.66%
41-50	5	16.67%

56.67% of the patients in our study were between the age group of 20-30 years. 26.67% between 31-40 years & 16.67% between 41-50 years.

Table 2: Gender Incidence:

Sex Incidence	No Of Patient	Incidence
Male	24	80.00%
Female	6	20.00%

80.00% of the tibial fractures were seen in males & 20.00% in females, depicting male preponderance.

Table 3: Mode of injury

Table No: Modeof injury	No. of patients	Incidence
Road traffic accident	19	63.33%
Fall from height	8	26.66%
Assault	1	3.33%
Direct blow (fall of object)	2	6.66%
Total	30	100

Road traffic accidents were the most common mode of injury in our study, causing tibial shaft fractures in 19 patients which accounted for 63.33% of tibial fractures.

Table 4: Based on the involvement of Limb

Involved limb	No. of patients	Incidence
Right	21	70.00%
Left	09	30.00%
Both	0	0
Total	30	100

In this study the right tibia was affected in 70.00 % of all patients and the left tibia in 30.00% of all patients

Table 5: Type of Fracture

Type of fracture	No. of patients	Incidence
Spiral	7	23.33%
Oblique	12	40.00%
Transverse	7	23.33%
Wedge (Butterfly)	3	10.00%
communitted	1	3.33%
Total	30	100

In this oblique fractures were seen in 40.00% of patients, followed by transverse fractures (23.33%), spiral fracture (23.33%), wedge fractures (10.0%) & comminuted fracture (3.33%). No case of segmental frac ure was observed.

Table 6: OTA Classification

OTA (AO) classification	No. of patients	Incidence
Type A	26	86.66%
Type B	03	10.00%
Type C	01	3.33%
Total	30	100

Table 7: Fracture Union

FractureUnioninWeeks	No. of Patient	Incidence
12-16	12	40.00%
17-20	6	53.33%
21-24	2	6.66%
TOTAL	30	100

In our study, fracture union of 16 patients (53.33%) was between 17-20 weeks & 12patients (40.00%) between 12-16 weeks, depicting that majority of the tibial fractures united before 20 weeks.

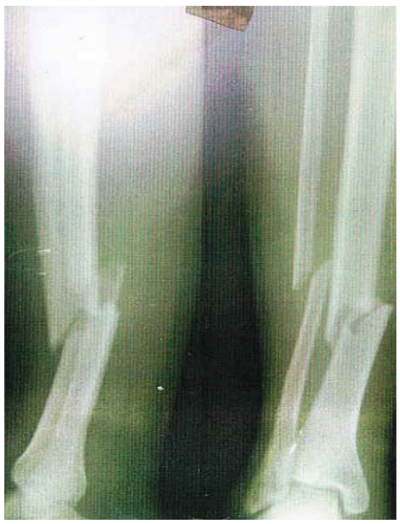
Table 8: Complication

Complication	No. ofpatient	Incidence
Superficial Infection	2	6.66%
Proximalscrew breakage	0	0
Distal screw breakage	0	0
Anterior kneepain	2	6.66%
shortening	0	0
Nonunion andnail breakage	0	0
Malunion	0	0

Table 9: Functional outcome

Functionaloutcome	No. of patients	Incidence
Excellent	23	76.66%
Good	05	16.66%
Fair	2	10.00%
Total	30	100

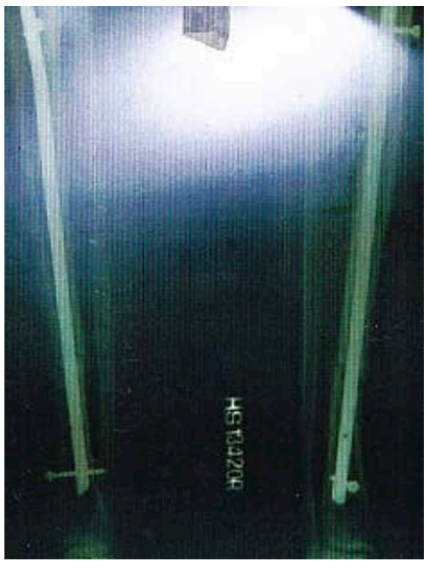
The functional outcome was observed to be excellent in 23 patients (76.66%), good in 5 patients (16.66%) & fair in 2 patients (10.00%).



Pre –op

Immediate post op

At 16 week



Pre op at 6 week

Immediate post op At 20 week

Discussion

Fracture shaft of tibia is one of the most common fractures encountered by the orthopedic surgeon. Over the years, various modalities of treatment have been used. The principle of biological osteosynthesis is rightly applied in long bone fracture healing and hence the selection of closed intra-medullary interlocking nailing in this study. Arne Ekelandet al [3] (1988), in study series of 45 patients noted the average age of patients to be 35 years. Similar studies by Court Brown et al [4] (1990) noted the average age to be 32.4 years & Court Brown et al5 (1995) was 37 years.However, in our study, 56.63% of the patients were in the age group of 21-30 years and the average age being 30.8 years. Tibial shaft diaphyseal fractures were seen in the younger age group probably because they are the people who are physically active, were engaged in increased various outdoor activities and as a result most of theinjuries sustained were high-velocity injuries.

A study by Hooper et al [6] (1991) showed that the incidence of fracture had male preponderance (82%). Similarly, Court Brown et al [4] (1990) & Gaston et al [7] (1999), showed the incidence among males was 81.3% & 81%, respectively. In our study, incidence in male was 80% in concordance to the other studies, pointing to the face that incidence in male is higher probably because of their more outdoor activities, while women majorly confined themselves to the domestic activities. Court Brown et al [5] (1995), showed that the commonest mode of injury was Road Traffic Accident accounting for an incidence of 37.5% Lawtence B. Bone etal8 (1986), reported in an earlier series a 90% incidence of Road Traffic Accidents in tibial shaft fractures while reported a 59% incidence in his series. In our series, we have found that 19 patients of the tibial diaphyseal fractures occurred due to road traffic accidents which accounted for an incidence of 63.33%.

In the majority of cases, they involved the patients who were the motorists, while the remaining patients tended to be pedestrians. This could be attributed to the poor road traffic sense and poor quality of roads, leading to a higher incidence of road traffic accidents in our country. In our series Type A fractures were the most commonest, they constituted 26 (86.66%). Type A fractures are unifocal fractures and in our series the incidence in higher to the series of Court Brown et al (1995), who found that Type A accounted for 54% of all tibial fractures. Our series had a higher incidence of oblique fractures in 40.00% of cases, transverse fractures made up 23.33% cases and spiral fracture (23.33%), which was comparable to a study by SankarsanPatroet al9 (1998), in whose series, there were 59% of these fractures. Court Brown et al reported 37.2% and Arne Ekeland [3] (1988), reported 42% of transverse and oblique fractures. The Tshcerne type of closed fracture in our series has been classified using theradiological criteria and in our series Tscherne Cl fracture made up of 53.33% ofclosed fractures 16 patients. This is comparable to Tscherne Cl fracture of about53%in the series by Court Brown et al (1995). Cl type of closed fractures is commonly seen in road traffic accidents. Fracture Union was considered when patient was full weight bearing without pain; fracture site was not tender on palpation and radiograph showed osseous union. In our series, majority of fractures united within 20 weeks (24 patients).

The averagetime of union was 17.36 weeks. This is comparable to Anglen J.O. et al [10] (1995), where 22.5 weeks was the average union time in

a reamed nailing. Lawrence B.Bone et al8 (1986), reported average union time at 19 weeks. Court Brown et al (1990), reported average union time at 16.7 weeks. Arne Ekeland et al (1988), reported average union time at 16 weeks. Final assessment in our series was done at 6 months using the Johner and Wruh's criteria, taking into account of the following criteria, gait, pain, deformity, range of motion of knee, ankle and subtalar joints, shortening and Neurovascular disturbances, ability to do strenuous activities, radiological union and presence or absence of non-union. Functional outcome was graded into Excellent, Good, Fair and poor. In our series, 76.66% (23 patients) have got excellent, 16.66% (5 patients) have good, 6.66% (2 patients) have fair. Klemet al11 (1986), reported 62.50% excellent, 31.8% good, 4.5% fair and 1.2% poor results. AtneEkeland et al3 (1988), reported 64.4% excellent, 28.8% good and 4.4% as fair.

Conclusion

Tibial diaphyseal fractures are commonly seen in physically active youngmale and are commonly seen as result of road traffic accidents. The interlocking nailing restores length, Alignment and controls rotation, preserves periosteal blood supply, some amount of endosteal blood supply andwith biological osteosynthesis, lowers the rate of infection and malunion. The advantage of locking screws over the conventional methods reduces the rate of malunion, loss of alignment, angulation and shortening which arecommonly found in a plaster cast or functional brace. The addition of locking screws extends its indications to within 5 cm of ankle and knee joint.

References

1. A. Page whittle, Campbell, 9th edition. Page no 2068.
2. Bamford D, Stanley closed intramedullary nailing of the tibia (Journal of bone and joint surgery, vol.72b, 1990; 926.
3. Arne Ekeland, B. Jorn. O. Thoresen, Antti Alho, Kuntstromsoe, Gunnar, fillers and arenhaukeb.: interlocking intramedullary nailing in the treatment of tibial fractures 1988; corr, 231:208-215.
4. Court Brown C.M, Christie J, Mc Queen M.M.: closed intramedullary tibialnailing; journal of bone and joint surgery, 1990, 72b:605-611.
5. Court Brown C. M, J. Mc Brine.: the epidemiology of tibial fractures; journal of bone and joint surgery, 1995, 77b:417-421.
6. Hooper G.J, Kidellp. G, Pennaji. D: conservative management or closed nailing for tibial shaft fractures, randomized prospective trial; journal of bone and Joint Surgery, 1991; 73b: 83-85.
7. Velazco A., Whitesides, T.E. [Jr] &Fleming, L.L: fractures of tibia treated with lottes nail fixation. (South Med. J. 74:427,1981)
8. Lawrence b. Bone, kenneth d. Johnson.: treatment of tibial fractures by reaming and intramedullary nailing; journal of bone and joint surgery, 1986, 68a:877-886
9. Sankarsanpatro, B.K. Sadangi, B.M. Mohapatro, U.N. Misra, S. M. Mohanty, M.R. Mohanpatro.: interlocking nailing in tibial fractures without „c arm; indian journal of orthopedics, 1998, 33: 175-178.
10. Anglenj. o: a comparison of reamed and undreamed nailing of tibia; journal of trauma, 1995:351.
11. Klemmk. W, Borner M. interlocking nailing of complex fractures of the femur and tibia (clinical orthopaedics 212; 89,1986).