ORIGINAL ARTICLE

Outcome of Reamed Intramedullary Interlocking Nail in Tibial Diaphyseal Fractures in Terms of Frequency of Union and Wound Infection

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ABSTRACT

Introduction: Open Fracture shaft of tibia is a common orthopaedic problem due to subcutaneous nature of bone, usually managed operatively. The usual operative modalities used for fixation of open fractures are the cast and braces, dynamic compression plate (DCP), external fixator and intramedullary nail (IMN). Postoperative complications reported after intramedullary nailing is infection 12.09%. Union after intramedullary nailing is 85.48%. Intramedullary nailing is the more common surgical treatment option for open tibial diaphyseal fractures (type I and II).

Objectives:- To determine outcome of reamed intramedullary interlocking nail in tibial diaphyseal fractures in terms of frequency of union and wound infection.

Material & Methods

Study Design: - Quasi Experimental Study

Setting: The study was conducted in Orthopedic Department of Allied and DHQ Hospital Faisalabad.

Duration of Study: - Eight months after the approval of synopsis. From 10-12-2012 to 10-08-2013

Results: 120 patients were included in study, 90 were males and 34 females. Patients were followed for wound infection at 12th postoperative day and union at 24 weeks.109 (87.90%) patients had no infection and 15(12.09%) patients developed infection. 106(85.48%) fractures healed in 24 weeks and 18(14.52%) either went into delayed union or non union.

Conclusion: It is concluded that reamed intramedullary interlocking nailing is a good mode of internal fixation in type I and II open fractures of tibia as it allows early weight bearing, minimizes the chances of infection and delayed union and has led to union in maximum cases.

Key words: Tibial diaphyseal fracture, intramedullary nail, Reamed nailing

INTRODUCTION

Tibia is exposed to frequent injury because of its location. It is the most commonly fractured long bone, because one third of tibial surface is subcutaneous through most of its length, open fractures are more common in the tibia than in any other major long bone. The blood supply to the tibia is more precarious than that of bones enclosed by heavy muscles. High-energy tibial fractures may be associated with compartment syndrome or neural or vascular injury. Locked intramedullary nailing currently is considered the treatment of choice for most type I, type II, type IIIA open and closed tibial shaft fractures. Intramedullary nailing preserves the soft tissue sleeve around the fracture site and allows early motion of adjacent joints. Delayed union, non union and infection are relatively common complications of tibial shaft fractures [1].

To prevent complications, various treatment regimens have been developed including acute delivery of I.V. antibiotics, repeated radical debridement followed by early local or free flap closure, rigid stabilization with external fixation or interlocking nailing and prophylactic bone grafting, open reduction and internal fixation using plate and screws [2, 3].

When operative fixation is indicated locked I.M. nail at present appears to be an attractive surgical option, as it is the only operative modality closest to the safe yet rewarding and time honored conservative treatment. Reamed intramedullary interlocking nail is a

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satisfactory treatment for rapid union of tibial shaft fractures[4,5,6] .

The complications include cellulitis, superficial infection, deep infection, loose screws, broken screws, malunion, minor knee pain and occasional fracture site pain after activity [7].The percentage of union of fracture shaft of tibia after reamed interlocking intramedullary nailing is 73.2% and wound infection 13.3%..

The rationale of the study is to provide a future guideline to the orthopedic surgeons to adapt reamed interlocking intramedullary nailing of type I and II Open tibial diaphyseal fracture as a primary treatment as compared to external fixation or Pin plaster with window, which is locally practiced, to decrease the morbidity and early return to normal activities.

OBJECTIVES

Objective of the study is to determine outcome of reamed intramedullary interlocking nail in tibial diaphyseal fractures in terms of frequency of wound infection and union of fracture.

MATERIAL & METHODS

STUDY DESIGN: - Quasi Experimental Study

SETTING: - The study was conducted in Orthopedic Department of Allied and DHQ Hospital Faisalabad.

DURATION OF STUDY: - Eight months after the approval of synopsis.

- **INCLUSION CRITERIA: -** All the patients with following common properties will be included in the study.
- Patients of both genders and age group >18 and <70 yrs.
- Patients with type 1, II, open fractures (Gustilo Anderson classification).
- Patient preference for surgical treatment.
- **EXCLUSION CRITERIA: -** Patients with following properties will be excluded from the study.
- Patients with type III open fractures.
- Patients with pathological fracture.
- Patients not fit for anaesthesia.

DATA COLLECTION PROCEDURE

A total of 124 cases were included in the study. After the approval of the study from hospital ethical committee informed consent was taken from all the included cases. All the patients fulfilling the inclusion criteria were subjected to the following common treatment.

Patients included in the study were selected from emergency department and outdoor. History was taken from all the included patients. Complete physical examination was done. 5cc blood was taken,2cc for CBC and 3cc for blood chemistry. Blood tests (CBC, Hepatitis B and C, blood urea, creatinine, RBS) were sent to the hospital laboratory and reported by Pathologist. X-ray of the fractured leg was done in radiology department and elaborated by senior registrar of orthopedic department. Timing of surgery in Type-I open fracture was immediate on available elective list and for type II open fractures after wound healing. The preoperative treatment included stabilization of patient in the form of blood transfusion and intravenous antibiotics. All the cases were operated by senior registrar or above level rank. Entry portal was made by making 5 cm incision along the medial border of patellar tendon extending from tibial tubercle in a proximal direction. Reaming was done through same incision after open reduction of the fracture as the nail chosen is non-cannulated solid nail donated by SIGN, U.S.A. . Chosen interlocking nail was inserted and locked. Wound was closed in layers. Postoperative check X-ray was done from same hospital's radiology department and elaborated by senior registrar. Patients were mobilized on 1st postoperative day and knee and ankle exercises were started. Patients were discharged on 2nd postoperative day on oral antibiotics and analgesic tablets for 10 days.. Patients were advised to strictly avoid weight bearing till radiological union is evident. Wound was checked on 10th postoperative day for infection. Stitches were out on 10th postoperative day on OPD basis. Patients were called at 4 weeks, 8 weeks and 14 weeks in OPD. Fresh X Rays were done from radiology department of the hospital and elaborated by consultant for Radiological evidence of callus formation. Information was collected on a proforma specifically designed for this study and includes demographic details and clinical and radiological evidence of union was reported.

DATA ANALYSIS PROCEDURE

All the collected data was entered and analyzed on SPSS 10. Descriptive statistics were calculated for all the variables. Mean and standard deviation was calculated for quantitative variables like age. Frequency and percentages were calculated for all qualitative variables like sex and union of fracture.

RESULTS

There were a total of 124 cases falling in the inclusion criteria. These were operated by same surgeons with

same implant i.e. intramedullary nail. *Mean age was 37.24.*

Youngest patient was 20 years old while oldest one was 60 years of age (Table 2).

There were 90 (72.5%) males and 34 (27.5%) females (Table 3). Tibial shaft fractures encountered in this study were described according to their respective geometry of fracture (Table 4). And according to Gustillo and Anderson classification (Table 5)

Results obtained in terms of geometry of fracture were as follows;

- Simple transverse fractures ----------78 (62.90%).
- Oblique fractures ----------25 (20.16%).
- Spiral fractures ----------18(15.38%).
- Segmental----------4(3.12%).

Results in terms of fractures according to Gustillo and Anderson classification are as follows.

- Type I…….. 92 (74.19%)
- Type II…… 32(25.81%)

Outcome of the patients was based upon post-operative wound infection on 12th postoperative day and union at 24 weeks. Results obtained were as follows;

Wound infection on 12th post operative day (Table 6)

109 (87.90%) patients had no wound infection.

15 (12.09%) patients had wound infection.

Union of fracture at 24 weeks (Table 7)

106(85.48%) fractures healed in 24 weeks

18(14.52%) fractures did not heal in 24 weeks.

Table 2: Age Distribution

	N	Minimum	Maximum	Mean	Std. Deviation
Age	124	20.00	60.00	37.24	7.37

Table 3: Gender Distribution

	Frequency	Percent
Male	90	72.5
Female	34	27.5
Total	124	100.00

Table-4: Geometry of Fracture Distribution

	Frequency	Percent
Simple transverse fractures	78	62.90
Spiral fractures	25	20.16
Oblique fractures	18	15.38
Segmental fractures	04	3.12
Total	124	100

Table 5: Distribution according to Gustillo and Anderson classification

	Frequency	Percent
Type I	92	(74.19%)
Type II	32	(25.81%)
Total	124	100%

Table 6: Wound Infection on 12th Postoperative Day

	Frequency	Percent
No wound infection	109	87.90%
Wound infection	15	12.09%
Death	0	0
Total	124	100.00

Table 7: Frequency of Union of fracture after 24 weeks

	Frequency	Percentage
Union in 24 weeks	106	85.48%
No or delayed union in 24 weeks	18	14.52%

DISCUSSION

Because of its location the tibia is exposed to frequent injury; it is the most commonly fractured long bone. Because one third of tibial surface is subcutaneous through most of its length, open fractures are more common in the tibia than in any other major long bone. The blood supply to the tibia is more precarious than that of bones enclosed by heavy muscles. High-energy tibial fractures may be associated with compartment syndrome or neural or vascular injury. Locked intramedullary nailing currently is considered the treatment of choice for most type I, type II, type IIIA open and closed tibial shaft fractures. Intramedullary nailing preserves the soft tissue sleeve around the fracture site and allows early motion of adjacent joints.[1].

Locked intramedullary nailing has revolutionized the management of tibial diaphyseal fractures. Unlocked nails have been used, but as very few tibial fractures are transverse or short oblique fractures located close to the isthmus, unlocked nailing is inappropriate for many closed and for most open

fractures. The use of interlocking nails means that virtually all tibial diaphyseal fractures can be stabilized with an intramedullary nail. The early interlocking nails were all reamed nails, but in the 1990s, surgeons became interested in using unreamed nails, and recently there has been considerable debate about the advantages and disadvantages of reaming.

Hooper et al[8] undertook the first prospective comparison of intramedullary nailing and cast management in closed and type I open fractures, finding that intramedullary nailing gave a statistically faster time to union as well as significantly less time off from work and hospitalization time. They also demonstrated a significantly greater incidence of malunion in cast-managed fractures and showed that joint movement returned much faster after intramedullary nailing.

In this particular study the most important complication of infection and non union was evaluated after fixing fracture shaft of tibia with locked intramedullary interlocking nail. 124 patients with mean age of 37.24 including 90 (72.5%) males and 34 (27.5%) females falling in inclusion criteria were operated by same surgeons with same implant i.e. interlocking nail.

Keating et al. reported a randomized, prospective study comparing reamed with unreamed locked nailing of open tibial fractures. Forty-seven nails were inserted after reaming, and 41 were inserted without reaming. The average time to union was 30 weeks for reamed nailing and 29 weeks for unreamed nailing, and there was no difference in functional outcome between the groups. Infection developed in two patients (4.3%) with reamed nailing and in one patient (2.4%) with unreamed nailing. Nine percent of fractures treated with reamed nailing did not unite compared with 12% of fractures treated with unreamed nailing. Overall, there was no statistically significant difference in the results of treatment of open tibial fractures with reamed nailing and with unreamed nailing except for the higher incidence of screw failure in the unreamed nailings.

Wiss and Stetson reported a 21% occurrence of deep infection in 33 type I and type II open tibial fractures treated with reamed nailing. Most patients initially were treated at other hospitals, and nailing was done several days or weeks after injury. The severity of soft-tissue injury and adequacy of débridement and soft-tissue coverage are more important in the prevention of infection than is the type of implant used. Currently, most orthopaedic traumatologists in North America accept the use of reamed nails in type I and type II open fractures; however, the use of reamed nailing in type III open fractures is controversial.[1]

CONCLUSION

On the basis of our study it is concluded that reamed intramedullary interlocking nailing is a good mode of internal fixation in type I and II open fractures of tibia as it allows early weight bearing, minimizes the chances of infection and delayed union and has led to union in maximum cases.

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