

TREATMENT OF CLOSE TIBIAL DIAPHYSEAL FRACTURE BY CLOSE INTERLOCKING NAIL

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ABSTRACT

Objective: to evaluate the results of locally made interlocking nail in closed tibial diaphyseal fracture.

Material and Methods: This observational hospital based study on 30 patients was done from March 2004 to February 2006 at Hayatabad Medical Complex Peshawar. Adults with type A or B close diaphyseal fracture of tibia located at 7 cm below the knee joint and 4 cm above the ankle joint of less than one week duration were included while open and pathological fractures were excluded from the study. Frequency distribution was analyzed with the help of Microsoft Excel and presented in graphs.

Results: Average age of patient was 35 years. Male were 26(86.66%) and female were 4(13.33%). There were 12(40%) type A and 18(60%) type B fractures. Twenty seven (90%) fractures were due to motor vehicle accident and 3(10%) were due to fall. The average healing time was 19 weeks with no mal-union. Fifteen (50%) fractures healed in 16 weeks, 9(30%) healed in 20 weeks, 5 (16.66%) healed in 24 weeks and 1 (3.33%) healed in 30 weeks time. Knee pain was observed in 21 cases. One (3.33%) patient had 10o restricted dorsiflexion while 1(3.33%) patient has 5o restricted eversion and inversion. Three (10%) patients had 10o restricted knee flexion while 1 (3.33%) patient had 20o restricted knee flexion. One nail (3.3%) got infected & was removed.

Conclusion: Interlocking nail of tibia with reaming has favourable results in managing tibial diaphyseal fracture in our set up.

Key Words: Interlocking Nail, Tibial Diaphyseal Fracture, Morbidity.

INTRODUCTION

The tibia by its location is exposed to frequent injuries as one third of its surface is subcutaneous. In treating the close tibial diaphyseal fractures there are different operative and non operative methods. The non operative methods are cast splintage/ Plaster of Paris (P.O.P) and functional bracing. It is an effective method of treating the close tibial diaphyseal fractures that avoids operative complications but it has higher incidence of ankle stiffness.¹ The operative method includes a variety of procedures like external fixation, open reduction internal fixation using plate and screws and intramedullary nailing. In 1960s and 1970s, plating was in vogue. In 1980s and early 1990s external fixation was most popular.² The plating resulted in higher incidence of non union, infection and fixation failure.³ The external fixation resulted in pin tract infection and

sometime osteomyelitis of the bone.⁴ Due to these problems a new technique Close Tibial Interlock Nailing was developed that minimize the chances of postoperative infection^{5,6}, promotes early union^{7,8}, regain early activity⁹ and reduce exposure and operative trauma.

Interlocking nail is an intramedullary nail that is fixed to the bone with screws at both ends. Close tibial interlocking nail is a procedure in which closed reduction of the fracture is done without opening the fracture site and then intramedullary interlocking nail is introduced at tibial tuberosity and fixed at both ends with screws. Close tibial interlock nailing was initially used without reaming but due to delayed union and non union the reamed interlocking was started.^{10,11} The purpose of this study was to evaluate the results of locally made interlocking nail in tibia in our set up.

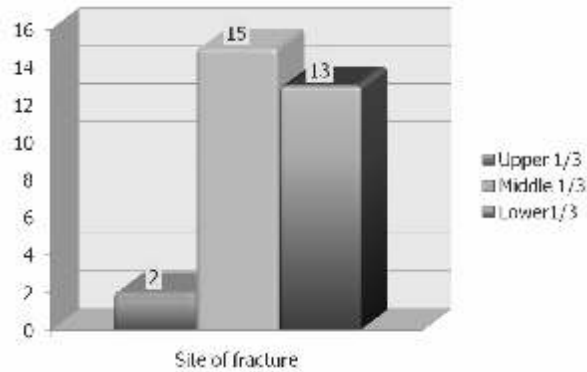
SITE OF FRACTURE (n=30)

Figure 1

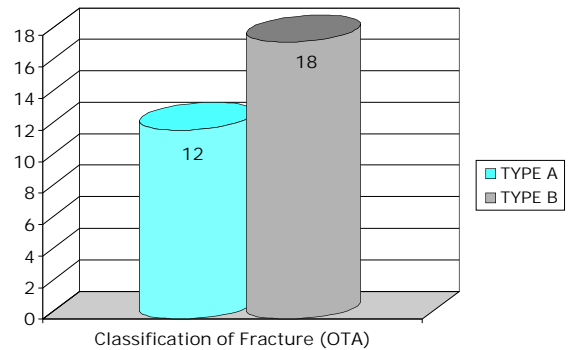
CLASSIFICATION OF FRACTURE (ORTHOPEDIC TRAUMA ASSOCIATION) TYPE A AND B (n=30)

Figure 2

Material and Methods

This observational study was done from March 2004 to February 2006 in orthopedic unit of Hayatabad Medical Complex Peshawar. A total of 30 patients were selected fulfilling the following criteria.

Inclusion criteria:

- Close diaphysial fracture of tibia.
- Adults (after the closure of epiphysis)
- Location of fracture (fracture 7 cm below the knee joint and 4 cm above the ankle joint).
- Types of fracture (Orthopedic Trauma Association classification type A and type B fracture).
- Duration of fracture (less than one week).

Exclusion criteria:

- Open fracture.
- Pathological fracture.

After fitting in the inclusion criteria of the admitted patient, a thorough history was elucidated, complete physical examination performed and investigations carried out. All the patients were counseled about their conditions which necessitated an urgency of the surgical procedure they had to undergo. Informed consent was taken from all patients. Preoperative Cefuroxime 1.5 gram was given on induction and locally made interlock nails (9-11mm of diameter and 320-380mm Long) were used. Antibiotics were continued for three days.

Patients were mobilized on first postoperative day and knee and ankle exercises were started. Patients were allowed for touch weight bearing on first post operative day, half weight bearing after six weeks when callus was seen on X-rays and full weight bearing after

fracture heals. Stitches were removed on fourteenth post operative day. Patients were followed up for fortnight for first visit and then every four weeks for subsequent visits for total time period of about 30 weeks. In each visit the progress of healing of fracture site was examined clinically and radiologically.

RESULTS

Total numbers of patient were 38 but eight patients were lost to follow up and were excluded from study and only thirty patients were followed up for 30 weeks. Age range was between 20 and 62 years and average age was 35 years. Twenty six (86.66%) were male and 4(13.33%) female patients. In 22(73.33%) patients there was right sided fracture and in 8(26.66%) left sided fracture had been recorded. Two (6.66%) patients had fracture of upper third, 15(50%) of middle third and 13(43.33%) of the lower third of tibia (Figure 1). There were 12(40%) type A and 18(60%) type B fractures according to OTA classification (Figure 2). Twenty seven (90%) fractures were due to motor vehicle accident and 3(10%) were due to fall (Figure 3). The average time of healing was 19 weeks. Fifteen (50%) fractures healed in 16 weeks, 9(30%) in 20 weeks, 5 (16.66%) in 24 weeks and 1 (3.33%) in 30 weeks time (Figure 4).

Knee pain was observed in 21 cases. Out of thirty patients, 28(93.33%) had full range of ankle movements, 1(3.33%) had 10 degree restricted dorsiflexion while 1(3.33%) had 5 degree restricted eversion and inversion. The range of movement in knee joint was more affected. Twenty six (86.66%) patients had full range of movements in knee, 3(10%) patients had 10 degree restricted knee flexion while 1(3.33%) patient had 20 degree restricted knee flexion.

Two patient developed blister on there leg after operation so their compartment pressure was measured (30 and 35 mmHg) with Whitesides

MECHANISM OF INJURY (n=30)



Figure 3

TIME OF HEALING IN WEEKS (n=30)

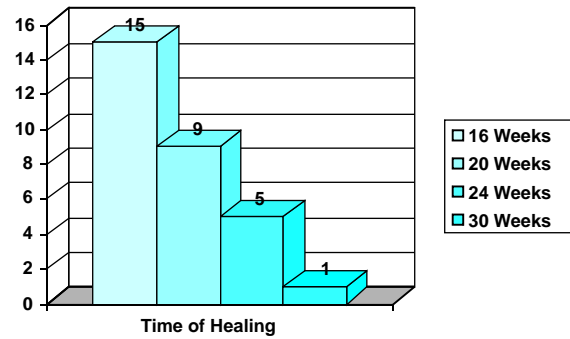


Figure 4

infusion technique and also their diastolic blood pressure (70 and 90 mmHg) was checked. These two patients were vigilantly kept under observation for compartment syndrome and were found to have no signs of the syndrome.

In 1(3.33%) patient there was delayed union that had been dynamized after three months. In another 1(3.33%) patient nail became infected which was removed, medullary cavity reamed to remove necrotic material, external fixator applied and the fracture healed in 24 weeks time. Nail broke in 1 (3.33%) patient (Figure 5) that was removed, then open interlock nailing with bone graft done and the fracture healed in 30 weeks. Two (6.66%) patients developed erythema at distal locking screw site. The distal locking screw was removed; Cefuroxime 1.5 gram given intravenously tid and the erythema subsided.

DISCUSSION

Larsen et al¹² studied 45 patients with reamed interlock nail in whom average time to fracture healing was 16.7 weeks and had two malunion while in our study healing time was 19 weeks with no malunion. Bonneville et al¹³ studied intramedullary nailing with reaming (Grosse-Kempf nail) in 32 patients in whom only one case (3.12%) developed deep infection while

in our study infection was 3%. He concluded that nailing with moderate reaming remains the preferred method for treatment of tibial diaphyseal fracture.¹³ Bonneville et al¹⁴ in an other study pointed out that there was normal range of active movement in knee and ankle while nineteen out of thirty eight (50%) patients complained of pain at the site of the nail insertion while in our study knee pain was observed in 21 (70%) cases. Steinberg¹⁵ and his colleagues studied 54 cases with tibial diaphyseal fracture. They pointed out 11 (20.4%) complications related to the nailing: 3 (5.55%) deep infection, 2(3.7%) superficial infection, 2 bone shortening of 1 centimeter secondary to nail protrusion in the knee, 1 compartment syndrome, 1 fracture propagation, 1 distal malalignment, and 1 delayed union.¹⁵ Väistö et al¹⁶ studied thirty six patients in whom 12 (33%) patients were painless at knee and ankle and 24 (67%) patients had anterior knee pain at follow-up while in our study knee pain was observed in 21(70%) patients.. Vidyadhara et al¹⁷ studied the clinico-radiological outcome of interlock nail in tibia in which he found that the average time of fractures healing was 20.1 weeks while in our study it was 19 weeks. He also pointed out that meticulous intramedullary nailing for tibial diaphyseal fracture has excellent clinico-radiological outcome and is relatively safe.¹⁷ A study done in Turkey included twenty-six fractures that were treated by reamed intramedullary nailing.¹⁸ The mean time to union was five months, while in our study it is 19 weeks. In their study they concluded that locked intramedullary nailing is more appropriate in comminuted fractures because of better preservation of periosteal circulation, and thus lower complication rates¹⁸. Court-Brown et al studied 25 patients with average union time of 15.4 weeks with no infection, malunion, non union or delayed union.⁸

COMPLICATIONS (n=30)

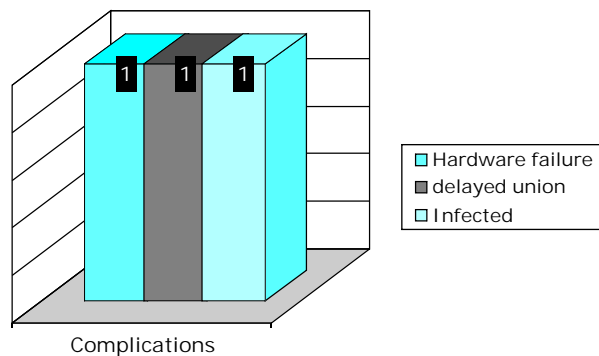


Figure 5

Petrisor et al¹⁹ in his retrospective review of patients who developed deep infection after reamed tibial nailing during a 15-year period

analyzed union, union time, compartment syndrome, requirement for reconstructive procedures, and development of deep infection.¹⁹ He pointed out that 43.8% patients developed infection that was because of inappropriate fasciotomy closure which has been done for compartment syndrome that developed after nailing.¹⁹ Lin J²⁰ studied 56 acute fractures treated with locked intramedullary nailing and found that union was achieved with mean time of 17.4 weeks while in our study the average time of healing was 19 weeks. It is evident from above fact that the locally made interlock nail is quite effective for treatment of tibial diaphyseal fracture in our set up.

CONCLUSION

Interlocking nail of tibia with reaming has good outcome with acceptable healing time and limited complications and can be used as a preferred method for the treatment of closed tibial diaphyseal fracture in our set up.

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