

CLINICAL & RADIOLOGICAL OUTCOME OF EXTRA ARTICULAR FRACTURES OF PROXIMAL 1/3RD TIBIA USING ANY FORM OF TREATMENT: A PROSPECTIVE STUDY

Orthopaedics

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ABSTRACT

Introduction: Tibia fracture accounts 5-11% of all tibia fractures. These fractures are the results of high-energy trauma frequently and can result in complex tissue injuries which involve bone and surrounding soft tissues. Extra-articular proximal tibial fractures are challenging clinical problems associated with undesirable outcomes. **Aims and objectives:** To study the clinical outcome of these types of fractures using any form of treatment including conservative or operative, to know the pros and cons of various form of internal fixation methods and to study any complications of these types of fractures. **Material and methods:** This prospective study was done in the Department of Orthopaedics, Government Medical College and Hospital, Jammu. A total of 45 patients with extra-articular proximal tibial fractures were included in the study after obtaining the informed consent. **Result:** It was observed that the mean age of the study participants was 39.78 ± 11.92 Years. It was reported that there were 24 (53.3%) cases of Road Traffic Accident and 21 (46.7%) cases of fall. Further, 44.40% patients had fibula fracture, 11.1% had instances of head injuries and 2.2% had abdominal blunt trauma associated injuries with tibial fracture. The primary treatment modality in the present study was I/M I/L Nail (33.3%) whereas external fixator, conservative treatment and MIPPO were done in 22.2% each patients. **Conclusion:** This prospective result shows that treatment of tibial shaft fracture with intra medullary interlocking tibial nail is a better option compared to other modalities.

KEYWORDS

Intramedullary nailing, Plating and Tibia fracture

INTRODUCTION

Approximately 5-11% of all tibia fractures are of proximal tibia fractures.¹ These fractures are the results of high-energy trauma frequently and can result in complex tissue injuries which involves bone and surrounding soft tissues. The common complications associated with proximal tibia fractures are wound breakdown, infection, and malunion.²

Various studies showed that despite various techniques of fixation, proximal tibia fractures are associated with poor outcome and increased rates of complications.

The problem of $>5^\circ$ angulation can be significantly improved with modifications to nail design and multiple surgical techniques including wise selection of nail starting point, supra-patellar nail insertion, nailing in semi-extended position, use of femoral distractor, collar / blocking screws and supplemental unicortical plates. Before the improvements mentioned above came into being, plating was considered the best choice for proximal tibial fractures.

Plating needs more invasive dissection and tissue stripping than nailing which can result in the complication, i.e. morbidity associated with deep surgical site infection.³

Meena RC (2014), demonstrated that the IMN (intramedullary nail) and PTP (proximal tibial plate) implants have shown promising results in extra-articular proximal tibial fractures, and provide rigid fixation that prevents secondary fracture collapse.⁴

In another study conducted by Naik MA et al. (2013), found that minimally invasive osteosynthesis using PLP (percutaneous locked plate) in extra articular proximal tibia fractures showed a promising result with minimal complications.⁵

The closed reduction, minimally invasive plating and multidirectional locked intramedullary nailing, have become the most commonly used treatment for proximal tibial fracture.

Extra articular proximal tibial fractures are challenging clinical problems associated with undesirable outcomes. The purpose of this study is to know the pattern and prevalence of extra articular fracture of proximal tibia, the clinical and radiological outcome of these types of fractures using conservative or operative methods.

AIMS AND OBJECTIVES OF THE STUDY

- To study the clinical outcome of extraarticular fractures using any

form of treatment including conservative or operative.

- To know the pros and cons of various form of internal fixation methods.
- To study any complications of these types of fractures.

MATERIAL AND METHODS

This prospective study was done in Department of Orthopaedics, Government Medical College and Hospital, Jammu, from Nov 2020 to Nov 2021 after obtaining the permission from ethical committee.

A total of 45 patients with extra articular proximal tibial fractures were included in the study after obtaining the informed consent.

Inclusion criteria:

- Extra articular fractures of proximal 1/3rd of tibia.
- Age > 18 years.
- Open/ closed fractures.

Exclusion criteria:

- Age < 18 years.
- Intra articular fractures and extension of extra articular fracture into intra articular.
- Fractures distal to proximal 1/3rd of tibia.
- Pathological fracture.
- Patient who doesn't follow up the treatment.

Before procedure and after procedure a detailed pre-operative and post-operative assessment was done. The clinical and radiological evaluation is done by Johner and Wruh's Criteria.

The data was collected and tabulated. Statistical analysis was performed using software package of statistical analysis (SPSS for Windows, version 19, Armonk, NY: IBM Corp). Descriptive statistics were calculated as mean and standard deviation for continuous data (age) and as number and percentage for categorical data. Comparison of study parameters was done using Chi-square test. The level of significance for the present study was set at a P value of less than 0.05.

RESULT

It was observed that the mean age of the study participants was 39.78 ± 11.92 Years (Range 18-76 Years). There were 11 (24.4%) participants in 18-30 years age group, 13 (28.9%) participants in 31-40 years age group, 14 (31.1%) participants in 41-50 years age group and 7 (15.6%) participants aged 51 years and above. And the majority of the participants were males (84.4%).

It was further observed that there were 24 (53.3%) cases of RTA and 21 (46.7%) cases of fall as shown in table 1 mode of injury.

Table 1. Mode of Injury

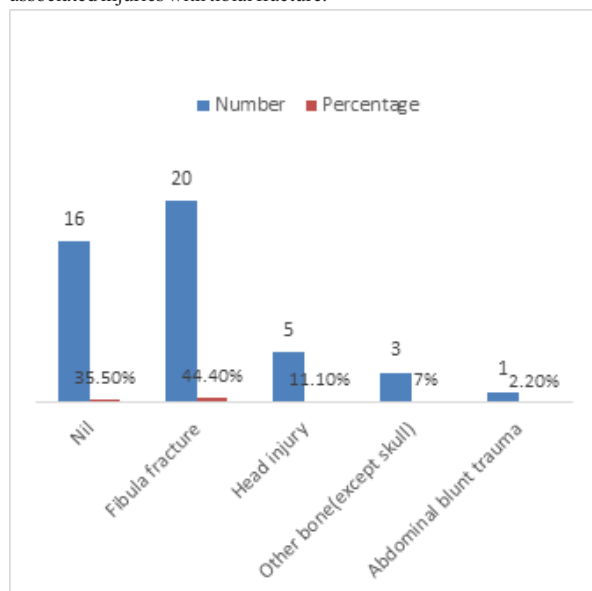
Mode of Injury	Number	Percentage
RTA	24	53.3%
Fall	21	46.7%

It was observed that 26 (57.8%) participants had left sided injury and 19 (42.2%) participants had right sided injury as depicted in table 2 side of injury.

Table 2 Side of Injury

Side	Number	Percentage
Left	26	57.8%
Right	19	42.2%

Graph 1 showed that 44.40% patients had fibula fracture, 11.1% had instances of head injuries and 2.2% had abdominal blunt trauma associated injuries with tibial fracture.

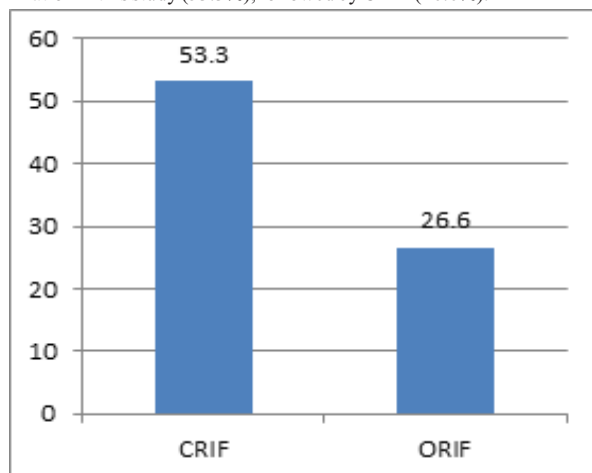
**Graph 1. Associated injuries**

The primary treatment modality in the present study was I/M I/L Nail (33.3%), external fixator, conservative treatment and MIPPO were 22.2% each as depicted in table 3.

Table 3 Treatment modalities

Gender	Number	Percentage
I/M I/L Nail	15	33.30%
External Fixator	10	22.20%
Plating	10	22.20%
Conservative	10	22%
Total	45	100%

Graph 2 depicts that CRIF was the primary method of reduction and fixation in this study (53.3%), followed by ORIF (26.6%).

**Graph 2 Reduction and fixation**

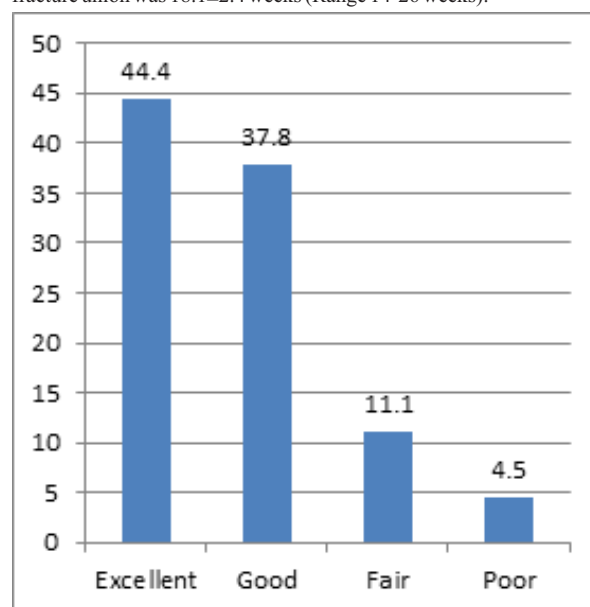
METHODS

In the present study, 51.1% patients achieved full ROM, 20% participants were able to achieve ROM of 0-140, 15.6% with ROM of 0-145 and 4.4% with ROM 0-100 as depicted in table 4.

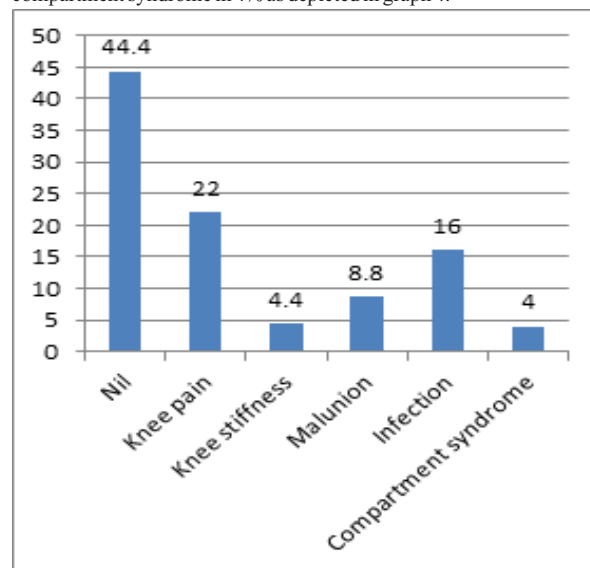
Table 4 ROM of study participants

ROM	Number	Percentage
0-100	2	4.40%
0-105	0	0.00%
0-110	1	2.20%
0-115	1	2.20%
0-125	1	2.20%
0-135	1	2.20%
0-140	9	20%
0-145	7	15.60%

Graph 3 depicts that in the present study 20 (44.4%) were categorised as Excellent according to Johner and Wruh's criteria, 17 (37.8%) as Good, 5 (11.1%) as Fair and 3 (6.7%) as Poor and mean duration for fracture union was 18.1±2.4 weeks (Range 14-26 weeks).

**Graph 3 Distribution of participants according to Johner and Wruh's criteria**

In the present study no complication was observed in majority of the participants (44.4%). 22% participants had knee pain, 4.4% had knee stiffness, malunion was seen in 8.8%, infection was seen in 16% and compartment syndrome in 4% as depicted in graph 4.

**Graph 4. Complications observed among study participants**

The present study demonstrated that the excellent clinical result was observed in 20 (44.4%) participants and good clinical result in 17 (37.8%). There were 5 (11.1%) participants with fair and 3 (6.7%) with poor clinical outcomes. And there was no statistically significant association between treatment type and clinical outcome (Chi-square value=3.964, P=0.914).

DISCUSSION

In this study 45 patients, who had proximal tibia fracture were included. Detailed examinations, investigations and pre-operative or post-operative follow up were carried out in all the cases. Data was analyzed and discussed with previous literature.

The mean age of the study participants was 39.78±11.92 years (Range 18-76 Years). The participants were predominantly males (84.4%). In similar study conducted by Morgan L et al., (2019), among 85 patients: 23 females, 62 males; mean age, 40.3 ± 19 years (range, 15–91 years). In another study conducted by Hendrickx et al., (2021), majority of patients were male (71.2%) with a median age of 37 years (range, 14–90 years).⁶

In present study there were 24 (53.3%) cases of RTA and 21 (46.7%) cases of Fall. There were 26 (57.8%) participants with left sided injury and 19 (42.2%) participants with right sided injury. There was fibular fracture seen as an associated injury in majority (44.4%) of the participants, no associated injury in 35.5% of the participants, 5 (11.1%) instances of head injuries and 1 (2.2%) case of abdominal blunt trauma. In a study conducted by Saied AR & Mobarake MK (2002), right tibia fractures were 50.4%, left tibia 48.4% and 1.2% patients had bilateral fractures. 29.1% had sustained no other associated injuries and 49% the only other injury was a fibula fracture. In 18.9% of the patients besides fibula some other bone fractures were seen too.⁷

In similar study conducted by Nidharshan S et al., (2017). The other associated injuries with tibial fracture was ankle injuries (16.58%), ribs/sternum (14.56%), and spine (14.0%) fractures. The two most common internal organ injuries were lung (12.52%) and intracranial (11.3%) injuries. Overall, 59.6% of tibial shaft fracture patients had at least one associated injury. 58.2% of patients had at least one other bony fracture and 16.7% of patients had at least one internal organ injury.⁸

In present study the primary treatment modality in the present study was I/M I/L Nail (33.3%) followed by external fixator, conservative treatment and MIPPO being 22.2% each. In similar study conducted by Nork et al., (2006), 37 (91.9%) proximal tibial shaft fractures treated with intramedullary nail.⁹ In another study conducted by Vidyadhara and Sharath (1995), 45 patients with proximal tibial shaft fractures treated with an intramedullary nail and reported seven (15.6%) cases of malunion.¹⁰

In another study conducted by Krettek C et al., (1999), suggests that medial and lateral blocking screws can increase the primary stability of distal and proximal metaphyseal fractures after nailing and can be an effective tool for selected cases that exhibit malalignment and/or instability.¹¹ In similar study conducted by Naik MA et al., (2013), uses percutaneous locked plate in Minimally invasive osteosynthesis in extra-articular proximal tibia fractures showed a promising result with minimal complications.¹²

In our study CRIF (53.3%) was the primary method of reduction and fixation followed by ORIF (26.6%). In the present study, more than half the participants (51.1%) were able to achieve full ROM, 9 (20%) participants were able to achieve ROM of 0-140, and 2 (4.40%) with ROM of 0-100. In similar study conducted by Cui Z et al., (2013), demonstrated that intramedullary nailing is an effective strategy and having good results in the management of tibial shaft fracture.¹³ In another study conducted by Meena RC (2014), demonstrated the shown promising results in extra-articular proximal tibial fractures, and provide rigid fixation that prevents secondary fracture collapse.⁴

In our study malunion was observed in 4 study participants. Among other participants, the mean duration for fracture union was 18.1±2.4 weeks (Range 14-26 weeks). In the present study 20 (44.4%) were categorised as Excellent according to Johnner and Wruh's criteria, 17 (37.8%) as Good, 5 (11.1%) as Fair and 3 (6.7%) as Poor. No complication was observed in 20 (44.4%) participants, 10 (22%) participants with knee pain, 2 (4.4%) with knee stiffness, malunion in 4

(8.8%), infection in 7 (16%) and 2 (4.4%) with compartment syndrome. In another study conducted by Bolhofner BR (1995), showed reliable healing and alignment were achieved in this often difficult fracture pattern, particularly for fractures that were difficult or impossible to treat with an intramedullary nail.¹⁴ A similar study conducted by Ghosh Set al., (2014), the average time to union was 19 weeks in Group II and 13 weeks in Group I (P<0.05).¹⁵

Only 2 cases in Group I complicated with superficial skin infection and only 2 cases complicated with deep infection. Deformity like shortening in length of limb in Group II was <1 cm in 12 cases, >1.5 cm in 6 cases and no shortening in rest of the cases, whereas in Group I: <1 cm in 4 cases and >1 cm in 2 cases.

In present study excellent clinical result was observed in 20 (44.4%) of participants, 17 (37.8%) as Good, 5 (11.1%) as Fair and 3 (6.7%) as Poor. The association between treatment type and clinical outcome was assessed using Chi-square test. The analysis showed that there was no statistically significant association between treatment type and clinical outcome (Chi-square value=3.964, P=0.914). The association between reduction & fixation method and clinical outcome was assessed using Chi-square test. The analysis showed that there was no statistically significant association between reduction and fixation method and clinical outcome (Chi-square value=7.874, P=0.547). In similar study conducted by Ghosh S et al., (2014), Excellent result found in 13 cases in Group I and 8 cases in Group II. Good result found in 6 cases in Group I and 16 cases in Group II. Fair result found in 2 cases in Group I and 6 cases in Group II. Poor result found only in Group II in 4 cases.¹⁵

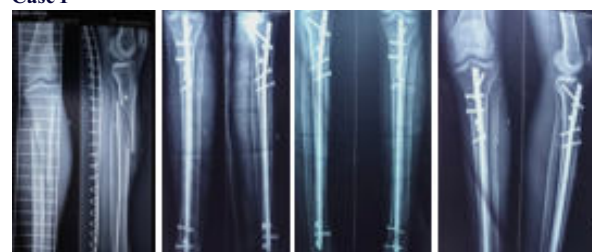
In another study conducted by Weiner LS et al., (1995), demonstrated the use of combination of internal fixation and hybrid external fixation in severe proximal tibial fractures reached to the conclusion that this technique is well suited for treating these difficult fractures. The surgeon was able to achieve restoration of anatomy, stable fixation, & a high union rate with little jeopardy to the soft tissues. Patients have achieved excellent function & motion.¹⁶

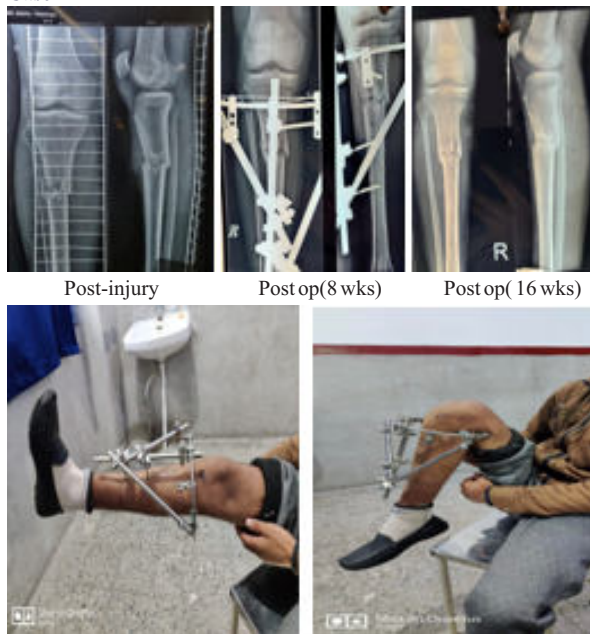
A similar study conducted by Vidyadhara and Sharath (1995), reported good functional outcomes in 96% of patients using lower extremity functional score.¹⁰ Another study conducted by Ramos et al., (2013) study showed that the Ilizarov method produces a good clinical outcome and is a valuable treatment alternative in proximal tibial fractures of all types.¹⁷

CONCLUSION

This prospective result shows that treatment of tibial shaft fracture with intra medullary interlocking tibial nail, is a better option compared to other modalities.

Case 1



Case 2**REFERENCES**

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