

**ORIGINAL RESEARCH**

# Assessment of outcome of reamed intramedullary interlocking nailing in type I and type II open fractures of shaft of tibia

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**ABSTRACT**

**Background:** The more proximal metaphysis and distal diaphysis are two examples of distal tibia fractures. The treatment of distal metaphysealtibial fractures with IM nailing is an effective alternative for the treatment of distal metaphysealtibial fractures. **Aims and objectives:** The present study was conducted to assess the outcome of reamed intramedullary interlocking nailing in type I and type II open fractures of the shaft of the tibia. **Materials and Methods:** The present randomised interventional study was conducted on 72 Gustilo and Anderson Type I and Type II open fractures of both genders. Parameters such as aetiology, union time, average duration of time interval between injury and intramedullary nailing, average range of motion, functional results according to the criteria of the Klemm and Borner scoring system, and complications were recorded. **Results:** Out of 72 patients, 42 were males and 30 were females. Aetiology was RTA in 48, fall in 15 and violence in 9 cases. The difference was significant ( $P < 0.05$ ). Union time (weeks) was 19.4 weeks, the average duration of the time interval between injury and intramedullary nailing was 4 days, and the and the average range of motion was 134.2 degrees. Functional outcome was excellent in 60, good in 8, and fair in 4. Complications such as delayed union were seen in 2, non-union in 1, and infection in 1 case. **Conclusion:** When reamed intramedullary interlocking nailing is used to repair open tibial fractures type I and type II, the anatomical functional outcome ranges from excellent to good, and the procedure is both safe and effective.

**Keywords:** distal metaphyseal, tibial fractures, outcome

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**INTRODUCTION**

One of the two bones of the leg is the tibia. Compared to the fibula, it is a superior and harder weight-bearing bone.<sup>1</sup> There are two condyles on the proximal end of the tibia: the medial and lateral. These combine to form the inferior part of the knee joint. Situated between the two condyles is the intercondylar section.<sup>2</sup> The menisci, posterior cruciate ligament, and anterior cruciate ligament are attached to this specific region. To support the condyles, the tibial shaft is narrowly expanded at the upper end.<sup>3</sup> The breadth of the distal tibia determines where "distal" tibia fractures are primarily distributed inside a square, according to the AO/ASIF system. The more proximal metaphysis and distal diaphysis are two examples of distal tibia fractures. Treatment for simple extensions of fractures with little displacement into the joint is frequently the same as for extra-articular fractures.<sup>4</sup> Getting an anatomically functional limb and getting

the patient back to their pre-injury level of function as soon as possible are the objectives of open tibial fracture therapy. The best course of action should help achieve this objective while reducing side effects.<sup>5</sup> The most common treatment in the past has been immobilisation in a plaster cast; however, this leaves the wound relatively exposed and does not necessarily maintain the length of the tibia. Plate fracture and nonunion are common issues with plate fixation, and the rate of deep infection is intolerable.<sup>6</sup>

**AIMS AND OBJECTIVES**

The present study was conducted to assess the outcome of reamed intramedullary interlocking nailing in type I and type II open fractures of the shaft of the tibia.

## MATERIALS AND METHODS

The present randomised interventional study was conducted on 72 Gustilo and Anderson Type I and Type II open fractures of both genders. The present study was conducted with those who met the specified criteria for inclusion and exclusion at the Department of Orthopaedics, Major S.D. Singh Medical College & Hospital, Farrukhabad, U.P., India, for a period of eight months (August 2011–April 2012). All were informed regarding the study, and their written consent was obtained. The Institutional Ethics Committee gave the study its approval. Data such as name, age, gender, etc. was recorded. Parameters such as aetiology, union time, average duration of time interval between injury and intramedullary nailing, average range of motion, functional results according to the criteria of the Klemm and Borner coring system, and complications were recorded.

### INCLUSION CRITERIA

- Patients to give written informed consent.
- Patient's age between 20-60 years.

## RESULTS

**Table I: Distribution of patients**

Total- 72		
Gender	Male	Female
Number	42	30

Table I shows that out of 72 patients, males were 42 and females 30.

**Table II: Assessment of Aetiology**

Aetiology	Number	P value
RTA	48	0.05
Fall	15	
Violence	9	

Table II shows that aetiology was RTA in 48, fall in 15 and violence in 9 cases. The difference was significant ( $P < 0.05$ ).

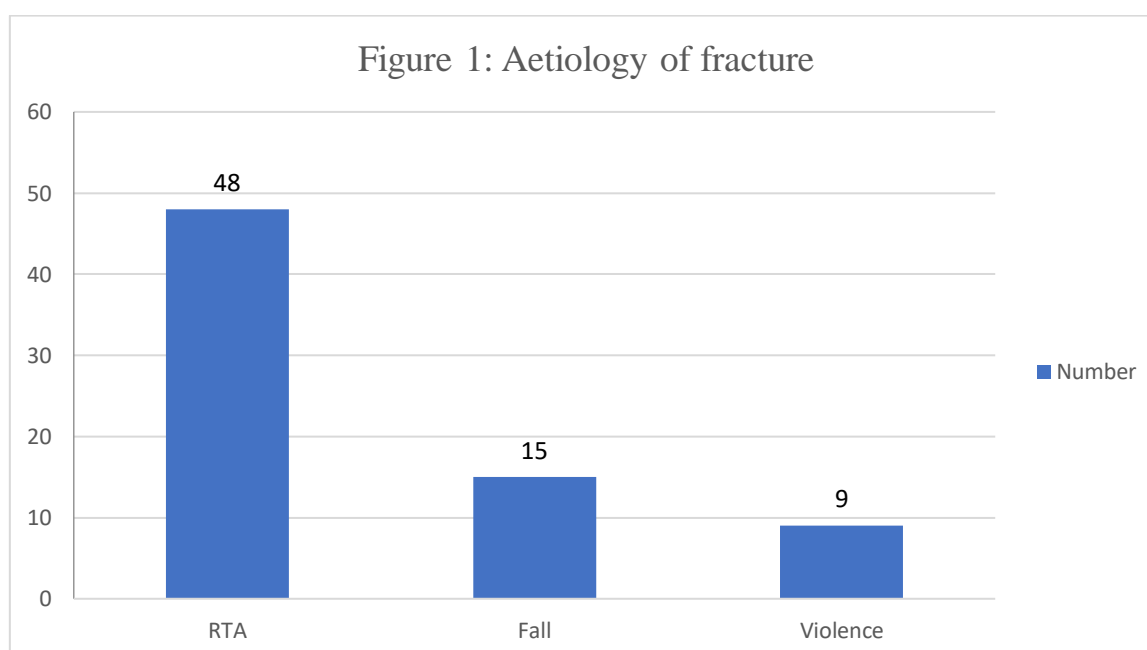
- Fractures of shaft of tibia involving up to 4cm from ankle joint, Gustilo and Anderson Type I and Type II open fractures.
- Available for follow up.

### EXCLUSION CRITERIA

- Patients not give written informed consent.
- Intraarticular fractures extending into upper or lower end of tibia, Closed fractures, pathological fractures and Gustilo and Anderson Type III open fractures.
- Those unable to attend follow-up.

### STATISTICAL ANALYSIS

The data obtained was subjected to statistical analysis using a Microsoft Excel spread sheet and analysed using SPSS. Chi-squared and Student's t-test was used as the test of significance was used to perform for assessed the statistical significance. A p-value less than 0.05 was deemed significant.



**Table III: Assessment of parameters**

Parameters		Mean	SD
Union time (weeks)		19.4	3.2
Average duration of time interval between injury and intramedullary nailing		4 days	25
Average range of motion		134.2 degrees	17.5
functional results	Excellent	60	-
	Good	8	-
	Fair	4	-
	Poor	0	-
Complications	Delayed union	2	-
	Non- union	1	-
	Infection	1	-

Table III shows that the union time (weeks) was 19.4 weeks, the average duration of the time interval between injury and intramedullary nailing was 4 days, and the average range of motion was 134.2 degrees. Functional outcome was excellent in 60 (83.33%), good in 8 (11.11%), and fair in 4 (5.55%). Complications such as delayed union were seen in 2 (2.78%), non-union in 1 (1.39%), and infection in 1 (1.39%) cases.

## DISCUSSION

For surgeons, distal tibia shaft fractures provide a major problem. With improved knowledge of the biology of soft tissues over the past few decades, the treatment of these fractures has changed.<sup>7</sup> Poor outcomes and high complication rates have resulted from placing more emphasis on anatomical reduction and disregarding soft tissues, which are frequently harmed.<sup>8</sup> Distal tibia fractures are worrisome since they are primarily caused by high-energy mechanisms and automobiles.<sup>9</sup> Distal tibia and pilon fractures are challenging to treat due to their complexity. When a critical bone injury occurs, the surrounding soft tissue components frequently suffer severe stress.<sup>10</sup> The present study was conducted to assess the outcome of reamed intramedullary interlocking nailing in type I and type II open fractures of the shaft of the tibia.

We found that out of 72 patients, males were 42 and females were 30. Aetiology was RTA in 48, fall in 15 and violence in 9 cases. Larsen et al.<sup>11</sup> determined if any differences exist in healing and complications between reamed and unreamed nailing in patients with tibial shaft fractures. Forty-five patients with displaced closed and open Gustilo type I-IIIa fractures of the central two-thirds of the tibia were enrolled. The average time to fracture healing was 16.7 weeks in the reamed group and 25.7 weeks in the unreamed group. The difference was statistically significant ( $P = 0.004$ ). There were three non-unions, all in the unreamed nail group. Two of these fractures healed after dynamization by removing static interlocking screws. The third non-union did not heal despite exchange-reamed nailing 2 years after the primary surgery and dynamization with a fibular osteotomy after an additional 1 year. There were two malunions in the reamed group and four malunions in the unreamed group. There were no differences for all other outcome measurements.

We observed that union time (weeks) was 19.4 weeks, the average duration of the time interval between

injury and intramedullary nailing was 4 days, and the average range of motion was 134.2 degrees.

At 12 months of follow-up, the functional outcome of the patients was assessed based on the Klemm KW and Borner MA scoring systems<sup>12</sup> and observed that out of 72 patients, the outcomes were excellent in 60 (83.33%), good in 11.11%, fair in 4 (5.55%), and poor not found, which are almost comparable to a study conducted by Tijoriwala P et al.<sup>13</sup> In this study, a comparison of functional outcomes at six weeks and 12 months was done, and a significant difference was found ( $p < 0.05$ ).

Complications such as delayed union were seen in 2 cases, non-union in 1 case, and infection in 1 case. Singer et al.<sup>14</sup> found that in their study, forty-three high-energy open tibialdiaphyseal fractures were treated with unreamed locked intramedullary nails from 1989 to 1992 and were reviewed at a minimum of 1 year from injury. There were 6 Grade I, 2 Grade II, 16 Grade IIIA, 9 Grade IIIB, and 1 Grade IIIC open fractures. Ninety-eight percent of the fractures united in an average time of 6.1 months. However, 47% of the fractures required an additional procedure before union. Complications included 49% of fractures with malunions, 12% deep infections, 41% locking screw breakages, and 20% compartment syndromes. These results are similar to those achieved with external fixation of open tibial fractures. The unreamed locked intramedullary nail has not improved the outcome of open tibialdiaphyseal fractures because the biologic consequences of the injury are of greater significance than the methods or techniques of fracture stabilisation.

## LIMITATION OF THE STUDY

The shortcoming of the study is the small sample size and the short duration of the study.

## CONCLUSION

The authors found that when reamed intramedullary interlocking nailing is used to repair open tibial fractures type I and type II, the anatomical functional

outcome ranges from excellent to good, and the procedure is both safe and effective.

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