



Original Article

Comparative Study of Functional Outcome in Closed Extra-Articular Distal One-Third Both-Bone Leg Fractures Treated with Fibular Fixation Versus Without Fibular Fixation

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ABSTRACT

Background: Management of distal one-third tibia-fibula fractures remains challenging due to the risk of malalignment, delayed union, and functional impairment. The role of fibular fixation as an adjunct to tibial intramedullary nailing remains controversial.

Objectives: To compare the radiological and functional outcomes of closed extra-articular distal one-third both-bone leg fractures treated with fibular fixation versus those treated without fibular fixation.

Methods: This prospective comparative study was conducted in the Department of Orthopaedics, Gauhati Medical College and Hospital, over a period of one year. Twenty skeletally mature patients with closed extra-articular distal one-third tibia-fibula fractures were included. Patients were allocated alternately into two groups: Group A (fibular fixation, n=10) and Group B (without fibular fixation, n=10). Clinical and radiological outcomes were assessed at 1, 3, and 6 months postoperatively. Functional outcomes were evaluated using the American Orthopaedic Foot and Ankle Society (AOFAS) score.

Results: The mean age was 42.6 ± 11.2 years in Group A and 41.3 ± 10.8 years in Group B. Road traffic accidents were the predominant mechanism of injury in both groups. Mean union time was shorter in the fibular fixation group (16.4 ± 2.1 weeks) compared to the non-fixation group (18.7 ± 2.8 weeks). Mean AOFAS scores at 6 months were significantly higher in the fixation group (88.4 ± 5.3) than in the non-fixation group (80.6 ± 6.9). Malalignment and delayed union were more common in the non-fixation group.

Conclusion: Fibular fixation in distal one-third tibia-fibula fractures resulted in superior alignment, earlier union, and improved functional outcomes. Fibular fixation should be considered as a useful adjunct in the management of these fractures.

Keywords: Distal tibia fracture; Fibular fixation; Intramedullary nailing; Functional outcome; AOFAS score; Fracture union.

INTRODUCTION

Distal tibia and fibula fractures constitute a significant proportion of lower-limb injuries and present considerable therapeutic challenges. Distal one-third tibial fractures account for approximately 37% of all tibial shaft fractures and are associated with increased rates of malunion and delayed healing owing to the metaphyseal anatomy and limited soft tissue coverage.

Intramedullary nailing has become a preferred treatment modality because it minimizes soft tissue disruption, reduces infection risk, and facilitates early mobilization. However, the necessity of concomitant fibular fixation remains debated. Proponents argue that fibular fixation improves rotational and coronal plane stability, restores

limb length, and decreases malalignment, while others suggest that it may not significantly influence fracture healing.

The present study was undertaken to compare the functional and radiological outcomes of distal one-third both-bone leg fractures treated with and without fibular fixation.

MATERIALS AND METHODS

Study Design

Prospective comparative study.

Study Setting

Department of Orthopaedics, Gauhati Medical College and Hospital, Guwahati, Assam, India.

Study Duration

One year.

Study Population

Patients presenting to the Orthopaedic Outpatient Department and Emergency Department with distal one-third both-bone leg fractures.

Sample Size

Twenty patients were enrolled and allocated alternately into two groups:

- Group A: Tibial fixation with fibular fixation (n=10)
- Group B: Tibial fixation without fibular fixation (n=10)

Inclusion Criteria

- Age between 18 and 80 years
- Skeletally mature patients
- Closed extra-articular distal one-third tibia-fibula fractures

Exclusion Criteria

- Open fractures
- Intra-articular fractures
- Segmental tibial fractures
- Pathological fractures
- Patients medically unfit for surgery
- Patients unwilling to participate

Preoperative Evaluation

All patients underwent:

- Primary and secondary trauma survey
- Ultrasonography FAST examination where indicated
- NCCT brain where required
- Radiographs of the leg including knee and ankle joints
- Computed tomography with three-dimensional reconstruction
- Routine hematological and biochemical investigations

Outcome Measures

Primary outcomes included:

- Time to radiological union
 - Functional outcome using AOFAS score
- Secondary outcomes included:
- Malalignment
 - Delayed union
 - Non-union
 - Infection
 - Implant-related complications

Statistical Analysis

Data were expressed as mean \pm standard deviation and analyzed using appropriate comparative statistical methods. A p-value <0.05 was considered statistically significant.

RESULTS

Demographic Characteristics

Parameter	Fibular Fixation (n=10)	Without Fibular Fixation (n=10)
Mean Age (years)	42.6 \pm 11.2	41.3 \pm 10.8
Male : Female	7 : 3	6 : 4
Road Traffic Accidents	80%	70%

Baseline demographic characteristics were comparable between the two groups.

Fracture Union

Group	Mean Union Time (weeks)
With Fibular Fixation	16.4 \pm 2.1
Without Fibular Fixation	18.7 \pm 2.8

Patients who underwent fibular fixation demonstrated earlier radiological union compared with those treated without fibular fixation.

Functional Outcome

Follow-up	With Fibular Fixation	Without Fibular Fixation
1 Month	58.2 \pm 6.1	52.4 \pm 5.8
3 Months	74.6 \pm 7.5	68.3 \pm 8.2
6 Months	88.4 \pm 5.3	80.6 \pm 6.9

The fibular fixation group demonstrated superior functional outcomes at all follow-up intervals.

Malalignment

Type of Malalignment	With Fibular Fixation	Without Fibular Fixation
Varus/Valgus $>5^\circ$	1	3
Rotational Deformity	0	2
Shortening >1 cm	0	2

Malalignment occurred more frequently in patients who did not undergo fibular fixation.

Complications

Complication	With Fibular Fixation	Without Fibular Fixation
Delayed Union	1	3
Non-union	0	1
Infection	1	1
Implant Prominence	1	Nil

The non-fixation group experienced a greater number of healing-related complications.

DISCUSSION

The present study demonstrated superior radiological and functional outcomes among patients treated with fibular fixation. Earlier fracture union, improved AOFAS scores, and lower rates of malalignment were observed in the fixation group.

These findings are consistent with the work of Egol et al., who reported reduced late malalignment following fibular plating in distal tibial fractures managed with intramedullary nailing. Morin et al. demonstrated biomechanically that fibular fixation enhances construct stiffness and resistance to rotational and coronal plane deformities.

Similarly, Varsalona and Liu highlighted the importance of fibular fixation in restoring limb length and

maintaining reduction. Prasad et al. observed a significant reduction in malrotation and malalignment with fibular fixation. More recent studies by Sonkusale et al. and Rawal et al. have further supported the role of fibular fixation in improving alignment and fracture stability.

The findings of the current study reinforce the growing body of evidence suggesting that fibular fixation contributes positively to fracture stability and functional recovery without substantially increasing complication rates.

Limitations

- Small sample size
- Single-centre study
- Short follow-up duration
- Alternate allocation instead of randomized allocation

Further multicentric randomized controlled trials with larger sample sizes are recommended.

CONCLUSION

Fibular fixation in closed extra-articular distal one-third tibia-fibula fractures resulted in earlier fracture union, superior maintenance of alignment, and better functional outcomes compared with treatment without fibular fixation. The procedure appears to be a valuable adjunct to tibial fixation and should be considered in suitable cases to optimize patient outcomes.

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