

EVALUATION OF FUNCTIONAL OUTCOME OF EXTRA-ARTICULAR LOWER THIRD TIBIA-FIBULA FRACTURES, WITH CONCOMITANT FIBULA FIXATION BY NAILING AND PLATTING A PROSPECTIVE STUDY

Orthopaedics

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ABSTRACT

The lower third of the tibia is devoid of muscular support, it has more chances of rotatory malalignment and valgus/varus mispositioning. Studies suggests that the fibula fracture should be fixed to maintain axial alignment Fibula can be fixed by closed nailing or ORIF with plate fixation. We conducted study to evaluate functional outcome and complication of Extra-articular lower third tibia-fibula fractures with concomitant fibular fixation. The study includes skeletally mature patients with Extra-articular lower third tibia-fibula fractures who underwent concomitant fibular fixation. The functional outcome and complication were evaluated by the "Ankle Evaluation Rating System" by Merchant and Deitz.. Patients were clinically and radiologically followed up at 6 weeks, 3 months, and 6 months. In this study, total 53 patients were chosen divided into 2 groups i.e., Group A and Group B, group A comprising 26 patients and Group B with 27 patients. Patients of Group A were treated with ORIF plating and patients of Group B were treated with CRIF and Nailing. The final outcome of the 2 groups was evaluated using the "Johner & Wruch's Criteria" and expressed as Excellent in the majority of cases. This was 65.38% in Group A and 37.04% in Group B. In Group A, 7 patients out of 26 were infected (26.92%). 6 patients had superficial infections and one patient had deep infections. Group B 2 patients out of 27 were infected (7.40%). This analysis suggests that the incidence of infection in Group B is significantly lower than that in Group A. The data in our study indicate that both plating and nailing of the Fibula offer good stabilization of the Tibia. The incidence of infection is significantly high following ORIF and plate fixation of Fibula, most cases have a superficial infection. This seems to be because of the increased morbidity of soft tissue to open procedures after a high-velocity trauma.

KEYWORDS

Extra articular tibia fibular fracture, Concomitant fibular fixation fibular plating, Rush nailing, Malunion, Infection

INTRODUCTION

Tibial diaphyseal fractures are the most common long bone fractures.(1)

In the lower limb, fractures can occur:

- (i) In the tibia alone,
- (ii) In the fibula alone, and
- (iii) More commonly, in both bones of the leg.

The treatment modalities described for Tibia and Fibula fractures range from simple cast immobilization to complex surgical procedures.(1)

For most tibial diaphyseal fractures, an interlocking nail of the tibia is the treatment of choice. As the lower third of the tibia is devoid of muscular support, it has more chances of rotatory malalignment and valgus/varus mispositioning. Considerable concern exists that malalignment of a healed tibial shaft fracture may result in post-traumatic arthritis of the ankle or knee.(2-5) As the location of the deformity approaches the ankle or knee, malalignment results in the maldistribution of articular surface pressures. This may predispose a patient to premature osteoarthritis. Studies suggests that the fibula fracture should be fixed to maintain axial alignment when treating a fracture of the distal third of the tibia and fibula. As it confers rotational stability on distal tibial fractures treated with intramedullary nailing. (6-7) Fibula can be fixed by closed nailing or ORIF with plate fixation. Both modalities have their own indications, advantages, and disadvantages.

We conducted a study on extraarticular distal third Tibia Fibula fractures, where the Tibia is fixed by locked intramedullary nailing. In contrast, the fibula is fixed with closed nails or ORIF with plate fixation, and the results are compared on the basis of axial alignment, radiological union, and complications.

METHODOLOGY

We conducted a Prospective study in a tertiary trauma center with the primary objective of comparing the effects of fixation of fibula by open reduction with plating and those with fixation of fibula by closed nailing. This was done in extraarticular fractures of the lower third of both bone leg fractures where the tibia was fixed with an interlocking intramedullary nail in all the cases.

Inclusion Criteria

- Patients with fractures of the lower one-third of the tibia and fibula

shaft (Upto 8 cm from the articular surface)

- Closed and Gustilo type I and type II open fractures
- Patients who have attained skeletal maturity when assessed radiographically

Exclusion Criteria

- Segmental tibia fractures
- Fractures with intraarticular extension where interlocking tibia nailing was not feasible

53 patients with fractures of the lower third of the tibia and fibula were included in our study. Written informed consent was obtained from all the patients. The appropriate treatment was given to the patients after approval by our institution's ethical committee. All patients underwent a primary survey and hemodynamic stabilization in the emergency department. In a secondary survey, other fractures were identified, the limb's neurovascular status was assessed, and a systemic evaluation was performed.

Appropriate anteroposterior and lateral radiographs were taken and the limb was immobilized on a below-knee splint. The fracture patterns were classified according to the Orthopedic Trauma Association (OTA) classification. Open fractures were classified according to Gustilo and Anderson's classification. In all cases, the tibial fracture was fixed with an interlocking intramedullary nail. The decision to fix the fibular fracture by plate or nail was taken by randomizing the cases.

Post-operative Protocol

On a post-op day 1 Non-weight bearing walking with a walker, isometric quadriceps exercise. When the pain subsides Knee and ankle Range of motion started.

Suture removal is done on post-op day 12.

Knee full range of motion started on post-op day 12.

Non-weight bearing for 6 weeks, partial weight bearing started when callus appears on x-ray. Full weight bearing started when there is 3 cortical union

Patients were clinically and radiologically followed up at 6 weeks, 3 months, and 6 months. In post-operative radiographs, tibial malalignment was measured. The degree of tibial angulation [varus or

valgus] was measured on anteroposterior radiographs by determining the angle formed by the intersection between the perpendicular lines drawn from the tibial plateau and the tibial plafond. At the end of six months, the range of movement (dorsiflexion and plantar flexion) in the ankle was determined. A clinical evaluation for the ankle functional assessment was obtained using the "Ankle Evaluation Rating System" by Merchant and Deitz.(8)

RESULTS

The observation is based on a follow-up of 53 cases. Divided into 2 groups

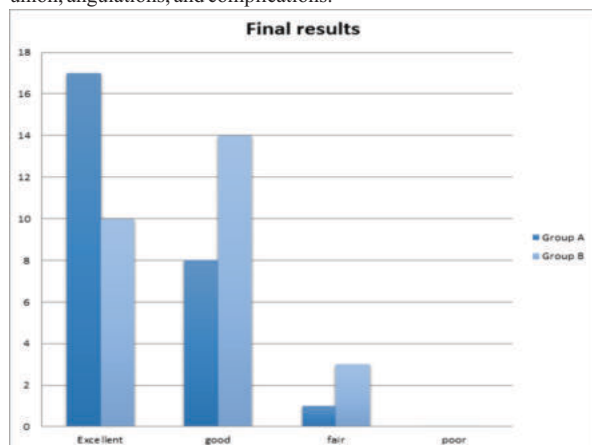
Group A contains 26 cases where the fibula is fixed by a plate and Group B contains 27 cases where the fibula is fixed by a Rush nail.

The 2 groups were comparable with respect to patient characteristics (age, gender, systemic comorbidities) and injury characteristics (mode of injury, type of fracture).

Table 1

S.no.	Final Result	Group A	Percentage	Group B	Percentage
1.	Excellent	17	65.38	10	37.04
2.	Good	08	30.77	14	51.85
3.	Fair	01	3.85	03	11.11
4.	Poor	00	00	00	00
		26	100	27	100

The final outcome of the 2 groups was evaluated using the "Johner & Wruch's Criteria" and expressed as Excellent in the majority of cases. This was 65.38% in Group A and 37.04% in Group B depending on the union, angulations, and complications.

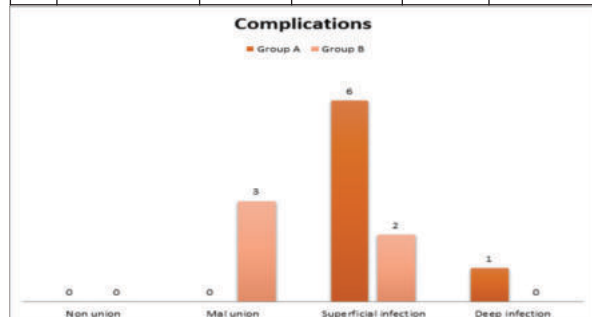


COMPLICATIONS

Main complication seen in group A was infection, whereas in Group B it was Malunion. Non-union was not seen in both the groups

Table 2-Complications

S. No.	Complication	Group A	Percentage	Group B	Percentage
1.	Non union	00	00	00	00
2.	Mal union	00	00	03	11.11
3.	Superficial infection	06	23.07	02	07.40
4.	Deep Infection	01	03.85	00	00
	Total	26		27	



INFECTION:

In our study, we observed Group A patients had a higher incidence of infection. In Group A, 7 patients out of 26 were infected. 6 patients had superficial infections and one patient had deep infections.

Group B 2 patients out of 27 were infected. All 2 patients had superficial infections.

Table 3 The Difference In Infection Incidence In The Two Groups Has A P Value Equal To 0.0293

	Infection	No infection	Total
Group A	7	19	26
Group B	2	25	27
	9	44	53

The observation is considered to be statistically significant.

This analysis suggests that the incidence of infection in Group B (Fibula fixed by closed nailing) is significantly lower than that in Group A (Fibula fixed by ORIF with plating).

DISCUSSION

Tibial fractures are frequently accompanied by concurrent fibula fractures. Of these fractures, distal third fractures are more significant since they are prone to malalignment. Tibial fixation maximizes fracture stability without increasing soft tissue morbidity through surgical intervention. The role of adjunctive fibular fixation in distal Tibial metaphyseal fractures has been controversial; although fibular fixation has been shown to improve distal Tibial fracture stability, there is increased potential for soft tissue-related complications and a delay in Tibial fracture healing.

Previous studies suggest that fibula fixation provides stability and decreases the incidence of tibial mal-unions in extra-articular distal third tibia fibula fractures treated by locked intramedullary nailing of the tibia but there is no consensus on the mode of fibula fixation. In our study, we fixed fibula by plate and by Rush nail to compare the union and functional results, advantages, and disadvantages of these modalities.

Out of 26 fibular plated patients, we found infections in 07 cases, 06 superficial, and 1 deep infection (fig 1) requiring wound debridement and patient infection settled after surgery. The total infection rate in Group A was 26.92%, whereas a superficial infection but no deep infection was found in 02 patients treated with rush nailing. This accounts for a total infection rate of 7.40%. This observation was similar to studies done by Arne Ekeland et.al (9) and Bone et.al. (10). The increased rate of infection occurs mainly due to soft tissue damage during plating after a high-velocity trauma.

In our study, significant angulations occurred in only 04 out of 27 patients (14.8%) fibula fixed by rush nail (fig2) all 4 patient had 5 degree valgus angulation and the fracture malunited in this position and all 4 patients had no clinical difficulties due to malunion. this observation is comparable to Pritchett et.al.(6) and F.J. Harvey et.al.(11)

In our study out of a total of 25 cases, with fixation of the fibula by ORIF and plate, in follow up we found that no significant angulation was seen in any of the 26 cases. This observation is similar to Kumar a .et.al(7) and Egol K.A. et.al(12). However, the angulations seen in the patient's fibula fixed with a rush nail had no bearing on the ultimate alignment of the Tibia and fracture union.

The final outcome of the 2 groups was evaluated using the "Johner & Wruch's Criteria" (13) and expressed as Excellent in the majority of cases. This was 65.38% in Group A and 37.04% in Group B depending on the union, angulations, and complications. However, the outcome did not affect the fractured Tibia union.

CONCLUSION

The lower third of the Tibia is devoid of any muscular support. When associated with a fibula fracture, it is prone to mal-alignment, therefore it is necessary to stabilize concomitant Fibula fractures. Although the loss of alignment is more commonly seen after closed nailing of the Fibula than plating, the overall incidence of significant angulations is fairly low. The data in our study indicate that both plating and nailing of the Fibula offer good stabilization of the Tibia when locked

intramedullary nailing is contemplated and thus prevents late malalignment.

The incidence of infection is significantly high following ORIF and plate fixation of Fibula, most cases have a superficial infection. This seems to be because of the increased morbidity of soft tissue to open procedures after a high-velocity trauma.

List Of Abbreviations

IM NAIL--Intramedullary Nail

OTA- Orthopaedic trauma association

ORIF--Open reduction and internal fixation

ROM-Range of motion

CONSENT

Informed consent obtained from the All the participants in the study. study conducted after getting clearance from institutional ethics committee.

Competing Interests

The Authors Declare that they have no Competing interests

Acknowledgements

NIL



Fig 1 Showing Deep Infection In Patient Underwent ORIF With Plating



Fig 2 Showing Patient X Ray With 5 Degree Valgus Angulation.

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