

Post Operative Complications Associated with Open Reduction and Internal Fixation of Distal Tibio - Fibular Fractures

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ABSTRACT

Introduction: Fractures of distal lower leg usually take longer to heal because of the marginal soft - tissue and compromised vascular supply in this area. Complications occur frequently, and many studies say that open reduction and internal fixation is associated with higher complication rates. This study was planned to evaluate the most common postoperative complications faced after intramedullary nailing or plate osteosynthesis carried out for such kind of fractures.

Material and Methods: All patients treated surgically over a 5 year period for distal tibio-fibular fractures were included. The data pertaining to their postoperative follow ups were collected and evaluated for the presence of any complications like wound infection, delayed union and non-union, synostosis and rotational malalignment. Patients' risk factors were also correlated with the occurrence of postoperative complications.

Results: A total of 205 patients were included and 65 complications were obtained. Majority complications were found accompanying closed fracture types that were treated with intramedullary nailing. Delayed union was found to be the most frequently occurring complication. In case of open fractures, treatment carried out using plate fixation had complications occurring at a rate of 15% compared to 28% after intramedullary nailing.

Conclusion: Distal tibio-fibular fractures are associated with a high risk of postoperative complications. Intramedullary nailing was reported to pose a higher risk of problems related to wound healing and postoperative wound infections.

Keywords: Post Operative Complications, Open Reduction and Internal Fixation, Distal Tibio, Fibular Fractures

INTRODUCTION

Proper surgical management and postoperative carefulness of distal tibio-fibular fractures can prove to be quite challenging, more because the bony as well as the associated wound healing of the distal lower leg fractures can be critical. Especially the blood supply of the lower leg, which runs axially, creates an imbalance of the blood supply intramedullarily to the distal tibia.¹ Also the adjoining soft tissue becomes susceptible as covering muscles are absent, causing a decreased bone healing capacity as well.¹

Surgically, treatment of distal tibiofibular fractures with intramedullary nailing (IMN) has been the mainstay of repair.² Many studies even advise intramedullary nailing in cases of open fractures.² However, with the introduction of the MIPO technique (minimally invasive plate osteosynthesis) and new plate designs that function as internal fixators³, plate and screw fixation to repair distal tibiofibular fractures is becoming increasingly popular.⁴

It has been identified since long that that intramedullary nailing is associated with increased incidence of postoperative complications with the focus primarily on non-union or wound

infections.⁵ Studies reporting the outcomes following surgical management of distal lower leg fractures often discuss tibial fracture fixation.⁶ Very few studies have been carried out to address the treatment of distal tibiofibular fractures.^{7,8}

Hence, the present study was designed to compare rate of postoperative complications associated with distal lower leg fractures treated with intramedullary nailing systems versus plate osteosynthesis.

MATERIAL AND METHODS

All distal tibio-fibular fractures treated surgically since 2011 till 2015 were evaluated. Data were compiled from the patients' clinical database.

A staged procedure with the initial placement of an external fixator was carried out for fractures associated with soft tissue damage, while fractures otherwise were managed by immediate definite fracture fixation. All fractures were surgically operated within 24 to 48 hours after injury. The implant selected depended on the location and type of fracture.

Study investigations most frequently pertained to radiographic results and an overall evaluation of patient charts. Paediatric patients, patients with numerous injuries and patients with inadequate clinical and/or radiographic charts were excluded.

The factors for postoperative evaluation were defined. Delayed osseous healing referred to absence of signs of osseous healing 15 weeks after surgical intervention was carried out. A specific time for non-union is usually tough to define considering the involvement of multiple cofactors in case of non-union. In the present study, non-union was declared if there was no bony consolidation seen even after 6 months postoperatively. The final outcome and follow-up were defined as complete osseous healing on radiographic films.

STATISTICAL ANALYSIS

Statistical analysis was performed using SPSS Software 22.0, and statistical significance was set at $p < 0.05$. P value was calculated by using chi square test.

RESULTS

A total of 205 patients, treated for distal tibiofibular fractures, since 2011 to 2015 were included.

Among the selected cases, 65 complications were seen

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postoperatively in 57 patients. Complications during follow-up were assigned into either early or late complications and were differentiated into wound infection, delayed osseous healing, non-union and postoperative synostosis.

It was found that a significantly higher number of complications were found in cases operated with an intramedullary nailing device (p = 0.008) (Table 1). Also a significant difference was found in the rate of complications occurring between open and closed fracture types (p = 0.002) treated with this technique (Table 2).

With complications occurring in regards to plate fixation, it was seen that a significantly higher number of complications were seen for distal metaphyseal fractures (p = 0.024) (Table 2). However, distal diaphyseal fractures showed a higher number of complications when treated with intramedullary nailing (p=0.03).

On an average, time taken for complete bony healing was 5.6 months (3–10 months) for patients without significant associated comorbidities. Patients with associated comorbidities had a prolonged bony healing time of 8.23 months (5–20 months).

DISCUSSION

The present study provided an insight to the complications associated with the different surgical fixation methods used for the management of distal tibiofibular fractures. The data used for the present study revealed that the most popular fixation method for distal tibio-fibular fractures was an intramedullary nailing device and it was associated with the highest threat of associated complications.

Delayed bony union was the postoperative complication seen most often after intramedullary nailing (IMN) followed by non-union. The fractures located in the distal tibial diaphysis are often found to be involved with complication, especially after intramedullary nailing.

Numerous studies have gone through various complications occurring along with the surgical management of distal tibiofibular fractures⁵; focused mainly either onto intramedullary nailing. Intramedullary nailing is usually linked to many postoperative complications more because repairing a fracture with IMN is carried out immediately and plate fixation follows a staged procedure after preliminary fracture stabilization with

an external fixator. Thus, the wound is coped up with greater care.

In the present study, patients with pre-existing risk factors like diabetes or peripheral arterial dysfunction led to an expected higher number of postoperative complications, which were primarily problems with wound healing followed by non-union. Among the two surgical techniques under study, no significant difference was found in the rate of postoperative complications among these patients.^{6,7}

This study presented with a few limitations. The norms for choosing the specific surgical modality in the present study could have led to a data bias in the compared groups. Also the disparity in the figures in the surgical treatment between intramedullary nailing and plate fixation also might lead to an outcome bias presenting more complications after intramedullary nailing.

Overall, a rate of 27% for the postoperative complications after surgical treatment of distal tibiofibular fractures is analogous to that reported in similar studies. Among young patients, such complex and frequently open fracture types occur due to a high velocity impact. In the elderly, even minor trauma can lead to such a fracture primarily due to poor bone quality.⁸

Careful analysis either by a preoperative CT scan, planning and treatment are mandatory for such complex fractures. A staged treatment is usually more preferable. Smaller size of skin incisions, comparatively easier postoperative care and early load bearing are the main benefits of intramedullary nailing devices.

Also modern plate designs offer comparable results after plate fixation in distal lower leg fractures, and these procedures can be carried out with a minimally invasive approach.

CONCLUSION

It is well known that the surgical management of distal tibiofibular fractures is usually challenging, primarily due to limited vascular supply in this area. Open fractures are usually associated with a higher risk of postoperative complications due to obvious reasons. In the present study, it is seen that intramedullary nailing device technique is associated with a greater number of postoperative complications, primarily delayed osseous healing.

Fractures in association with soft-tissue damage of the distal diaphyseal tibia managed with intramedullary nailing have a higher risk for delayed osseous healing. In total contrast, for plate fixation, distal metaphyseal fractures with soft tissue damage are associated with postoperative wound healing problems and wound infections.

The authors recommend a staged procedure with primary fracture stabilization by placing an external fixator followed by a specific fracture fixation after adequate soft-tissue conditioning for such challenging fracture types.

Complication	IMN	Plate Fixation
Wound Infection	5	3
Delayed healing	19	14
Non-healing	12	9
Synostosis	2	1
Total	38	27
p-value	0.008	

Table-1: Distribution of complications associated with the specified surgical technique

Complications	Distal Metaphyseal Fracture		Distal Diaphyseal Fracture		p - value
	IMN	Plate fixation	IMN	Plate fixation	
Closed Fractures	2	7	10	1	0.002
Open Fractures	5	16	21	3	
Total	7	23	31	4	
p- value	0.024		0.03		

Table-2: Distribution of complications among the fracture types and the method of fixation used

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