



## A STUDY OF FUNCTIONAL OUTCOME OF COMPOUND TIBIAL FRACTURES TREATED WITH UNILATERAL TUBULAR EXTERNAL FIXATION AS DEFINITIVE METHOD:

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### ABSTRACT

A study of functional outcome of compound tibial fractures treated with unilateral tubular external fixation as definitive method:

**INTRODUCTION:** Among long-bone fractures, those of the tibial diaphysis occur most frequently. The basic goal of fracture treatment is to stabilize the fractured bone to enable fast healing and return of full function of the injured extremity. Due to increased incidence of road traffic accident, there is increase in surge of compound fractures. Intramedullary (IM) nailing is considered the method of choice for treatment of closed diaphyseal fractures of the tibia. The aim of this study was to evaluate the effectiveness of unilateral external fixator as primary and definitive treatment for open tibial fracture.

**AIM OF THE STUDY:** The aim of this study was to evaluate the effectiveness of unilateral external fixator as primary and definitive treatment for Gustilo and Anderson compound tibial fractures.

**MATERIALS AND METHODS:** In all, a total of 26 cases were evaluated and assessed during the study period of 2 years. Patients admitted with compound tibial fractures were classified under Gustilo and Anderson classification. All the cases that were treated with unilateral tubular external fixators within 24 hours of injury were included. Serial debridement and early coverage if required, was done within seven days. Dynamisation and partial weight bearing was started at 8-10 weeks on observing early signs of fracture healing. Weight bearing with patellar tendon bearing cast was permitted at 12-16 weeks, on visualization of bridging callus and continued till radiological and clinical union. Patients were followed up at an interval of 6 weeks, 3 months, 6 months and 12 months.

**RESULTS:** There were 21 males & 5 females with compound tibial fractures with a mean age of 34 years. The commonest mode of trauma was road traffic accidents followed by fall from height & direct trauma to the limb. All the patients were operated in emergency within 24 hours with debridement of wound and primary external fixation. The average time to union was 21 weeks, superficial pin track infection occurred in 5 cases & deep infection leading to loosening of Schanz screw was seen in two patients. Delayed union was seen in two patients.

**CONCLUSION:** The results show that unilateral external fixators can be used as primary and definitive treatment for compound tibial shaft fractures with satisfactory outcomes. These are particularly helpful in resource limited setups. Appropriate and accurate reduction of fractures followed with good soft tissue cover aids good fracture union and return to early function.

**KEYWORDS :** Unstable External fixation, Definitive treatment, Open tibial fractures External fixation, Definitive treatment, Open tibial fractures

### INTRODUCTION

Tibial shaft fractures are the commonest open fractures of long bones owing to the anatomic location & precarious soft tissue coverage.[1,2]. Intramedullary interlocked nailing is considered as gold standard for the treatment of close diaphyseal & Gustilo Anderson type I, II & most of III fractures of tibia, however, there are conflicting results in literature making it a grey area with no clear defined guidelines.[3,6] The treatment modalities in such compound fractures are, primary intramedullary nailing (unreamed), external fixation followed by intramedullary nailing & primary external fixation as a definitive treatment.[2,6] The incidence of infection in fractures which were first treated by external fixation and then with IMIL nailing was considerably much higher than those fractures treated with Primary IM nailing.[4,6]

The overall cost of treatment is a major factor in deciding the modality of treatment. External fixators are way cost effective. We generally treat compound fractures more than grade 2 with definitive external fixation.

This retrospective analysis was done with an aim to evaluate the functional outcome & complications of external fixation as a primary and definitive line of management for open fractures of tibia.

### MATERIALS AND METHODS

This retrospective analysis was done in a tertiary care institute of GVMCH Villupuram south India, which serves as a referral centre for peripheral/rural health centres. Between Jan 2017 & May 2019 a total of 56 patients of Compound fractures were treated at this institution. We excluded the patients that were treated by primary IMIL, delayed IMIL, Gustilo Anderson I, II, IIIA, IIIC fractures, & poly-trauma patients with other severe injuries that can influence the rehabilitation & outcome. A total of 26 patients constituted the study group that were treated by simple tubular external fixation as a primary & definitive mode of treatment & having at least one year of follow up. The data regarding status of union, infection, pin loosening, malunion time of weight bearing and any other associated complication was noted. We allowed the patients to bear partial weight at around 10 weeks followed

by conversion to PTB cast and weight bearing as dictated by clinical & radiographic progression of healing.

### RESULTS

There were 21 males & 5 females with Gustilo III fractures, treated by simple tubular external fixation as a primary and definitive mode of treatment during the study period with a mean age of 34 years. Right tibia was fractured more frequently (n=22) compared to left (n=4). The commonest mode of trauma was road traffic accidents followed by fall from height & direct trauma to the limb. All the patients under study, reported within 24 hours of injury and were operated in emergency within 24 hours with debridement of wound and primary external fixation. Repeat debridement if required was done within 48-72 hours, early soft tissue coverage (within 7 days) was preferred whenever required. The average time to union was 21 ± 4 weeks in our study with a range of 16-28 weeks.

Superficial pin track infection occurred in 5 cases & deep infection leading to loosening of Schanz screw, requiring reapplication of pin, was seen in two patients. All the superficial pin infections were managed by daily dressings, wound lavage and a short course of antibiotics based on culture and sensitivity on a day care basis. We applied PTB cast in all our patients and allowed full weight bearing after seeing clinical & radiological signs of healing, to further consolidate the fracture healing. There were two cases of delayed union in our series.

### DISCUSSION

The management of compound Gustilo type III fractures is not well defined with much controversy among the available choices. There are many factors which help decide among available options including condition of wound, available resources, surgical expertise, associated injuries & comorbid conditions, however, there are no well defined guidelines. Many researchers have supported primary external fixation of open tibial fractures followed by definitive internal fixation as and when the soft tissue condition permits. [2,10]

In a meta-analysis of randomized controlled studies comparing

primary external fixator with intramedullary interlocked nailing (unreamed) no statistically significant difference was found between the two procedures.[2]

The authors further carried out an indirect comparison between reamed & un-reamed nailing & concluded that reamed nailing reduces the rate of reoperation but not that of infection and non-union.[2] Giannoudis et al reported a 24% incidence of delayed union in 536 open fractures treated by external fixator of which 82% were Gustilo type III fractures.

In another study on external fixator as definitive mode of treatment in 212 patients, Michail Beltrios et al reported a union rate of 87.27%, they had eighteen cases of non-union, 21 delayed unions and four cases of mal-union, pin-tract infection was seen in 26.36% of patients and chronic osteomyelitis in three cases.

We generally use this method only .As external fixator was available in our institute and was provided free of cost to the patient, we continued it as a definitive method (Fig 1 & 2). Many surgeons have alleged that there are conclusive advantages of primary intramedullary nailing provided the risk of infection could be lowered by cautious and radical debridement of wounds and proper use of antibiotics.

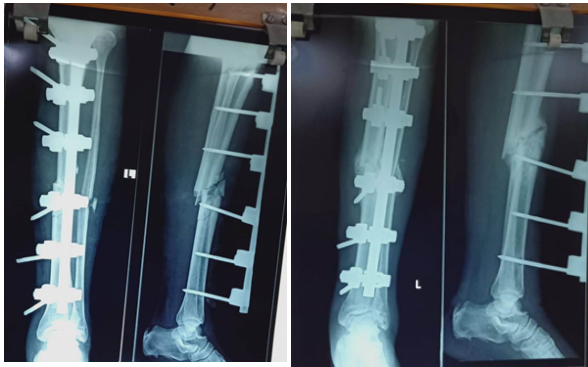
The sequential technique of secondary nailing after external fixation may be associated with a high rate of complications[.4]

The average time to union in our study was 21weeks which was comparable with other published series, delayed union in two cases. In another study on efficacy of external fixators as a primary method of treatment, 79 compound tibial fractures were treated with unilateral uniplanar external fixators. Average time to union was 20 weeks, pin track infection was seen in 45.2% patients, ankle stiffness in 10.9% and leg shortening in 2.8%. The incidence of superficial pin track infection in our series was 29.72% that was managed by standard procedures and deep seated infection leading to pin loosening and a need for reapplication was observed in two patients (5.40%).

## CONCLUSION

This retrospective analysis revealed that external fixators can be safely used as the primary and definitive mode of treatment in Gustilo type III open fractures of tibia, with satisfactory results comparable to other modalities, in a cost effective manner, especially in the resource limited conditions of developing countries. Achieving accurate reduction of fracture either by direct or indirect means and early soft tissue cover of fracture site needed for fracture healing. patient education is utmost important in these method of treatment .

## Cases:



Case 2: type 3 c fracture:



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