

## Outcome Of Tibial Shaft Fractures Treated With Mipotechnique: An Interventional Study

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### Abstract:

**Background:** The goal of treating tibial fracture is to obtain early union in acceptable anatomical position with early functional return of activity. In view of raising road traffic accidents, there is increased risk of multifragmentary periarticular fractures of the tibia. MIPO technique provides accurate fixation by achieving anatomical reduction and restoring alignment of limb. As there was a paucity of literature on outcomes of MIPO technique for tibial mid-shaft fractures in developing countries like India, the current study was undertaken.

### Aim:

To know the clinical and radiological outcomes of tibial fractures treated using MIPO technique

**Materials and Methods:** 50 patients of any age and gender admitted at the tertiary care center named GEMS, at Srikakulam, Andhra Pradesh were included. This interventional study was done in the Department of Orthopedics. Patients with open fractures and pathological fractures were excluded.

**Results:** Most of the patients were aged 21 to 30 years. Most of the patients were males and had type A fracture as per AO classification. Most of the patients had type A fracture. Most of the patients had fracture on left side and the most common complication seen was delayed union. Most of the patients showed good outcomes as per SJLAM criteria. The mean time for union is 23 weeks.

**Conclusion:** MIPO technique is considered a reliable approach in treating tibial shaft fractures, especially those which are not suitable for intramedullary nailing. We recommend MIPO technique with LCP to provide stable fixation and good clinical and radiological results.

**Keywords:** Tibial fracture, MIPO technique, Open reduction, Internal fixation, Clinical outcomes

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### I. INTRODUCTION

The goal of treating tibial fracture is to obtain early union in acceptable anatomical position with early functional return of activity. In view of raising road traffic accidents, there is increased risk of multifragmentary periarticular fractures of the tibia. Tibial shaft fractures are one of the difficult fractures to treat due to the less blood supply and relatively less amount of soft tissue that covers the tibia, which leads to open fracture, and significant disabilities.

Treatment options of tibial fractures include closed reduction and cast application, closed reduction and internal fixation with Minimally Invasive Plate Osteosynthesis (MIPO) technique. Intramedullary nailing (IMN) is the treatment of choice for diaphyseal tibial fractures, as it causes bone healing with preservation of osteogenic fracture hematoma apart from providing proper mechanical stability<sup>1</sup>. Malunion, malalignment and knee pain are the complications of this approach<sup>2,3</sup>. MIPO technique is another option for tibial shaft fracture. It provides preservation of blood supply and fracture hematoma and promotes secondary biological healing. For distal fractures, MIPO technique provides accurate fixation by achieving anatomical reduction and restoring alignment of limb. Wound infections are also less common with MIPO technique, as it spares subcutaneous tissue of anterior medial tibia and enables soft tissue coverage on the plate<sup>4</sup>. Certain previous studies reported good clinical outcomes among patients with shaft fractures with good wound healing as well as fracture union<sup>5-8</sup>

As there was a paucity of literature on outcomes of MIPO technique for tibial mid-shaft fractures in developing countries like India, the current study was undertaken.

### Objectives:

1. To know the effectiveness of Melatonin in stroke patients
2. To study the side effect profile of melatonin in stroke patients

## II. MATERIAL AND METHODS

**Study site:** Department of Orthopaedics, Great Eastern Medical College and Hospital, Ragolu, Srikakulam, Andhra Pradesh, India

**Study duration:** Six months: July 2022 to December 2022

**Sample size:** 50

**Type of study:** Interventional study

The study is Interventional, as surgical therapy was provided to all patients as a part of study.

**Ethical considerations:**

Informed consent was taken from every patient who participated in the study.

**Inclusion criteria:**

- Male and female subjects of any age with tibial shaft fractures who presented to our tertiary care center.
- Patients who provided informed consent were included

**Exclusion criteria:**

- Patients with open fractures
- Patients with fractures associated with neurovascular injury
- Patients with pathological fractures.
- Patients who are unsuitable for rehabilitation.

## III. Methodology:

All study patients underwent checkup before anesthesia and diagnosis was confirmed by plain radiographs taken in anteroposterior and lateral views. After obtaining written informed consent, the patients underwent surgery under spinal anaesthesia. Non-weight bearing ambulation was initiated during 2nd post-operative day. Sutures were removed during 12th postoperative day. Fractures of tibia were classified using AO/OTA classification 42.

**Surgical technique:**

The patients were kept in supine position on radiolucent table with 15° of flexion of knee joint. Tibia was exposed proximal and distal to fracture site, and fracture reduction was done by indirect reduction techniques using pointed reduction forceps. Skin was incised 2–4 cm distal or proximal to the fracture site as per the fracture location, and a tunnel was made with Cobb's elevator, through which plate was passed by fluoroscopic guidance. After plate insertion, positioning of plate was confirmed by fluoroscopy. After placement of locking screws, fluoroscopy was done to check for alignment. Additional fixation was achieved using screws at both ends. Bone and functional results were classified into 4 categories as per the SJLAM criteria:<sup>9</sup>

Excellent:	Range of movement(ROM) of adjacent joints was 80 to 100 % of normal. There is no pain in doing daily activities.
Good	ROM is around 60 to 80% of normal. Pain is not sufficient to cause change in daily routine.
Fair:	ROM is 30–60% normal. Pain is sufficient to cause restriction of daily activities.
Poor:	ROM is less than 30% of normal. Pain causes severe disability.

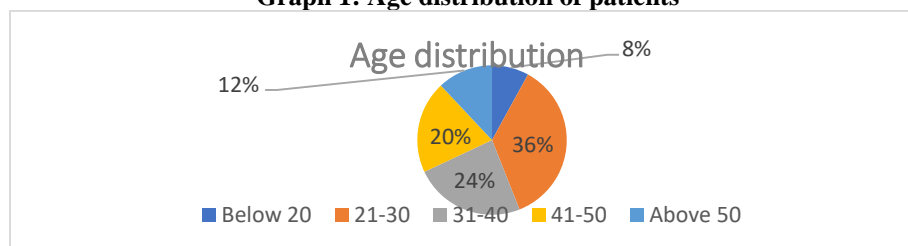
**Statistical analysis:** Data were analyzed using SPSS 23.3 software. Mean, SD, percentages, and frequencies were used.

## IV. RESULTS

**Age distribution:**

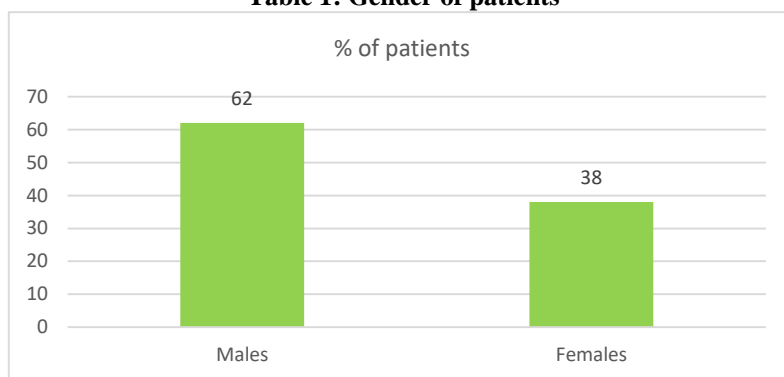
Most of the patients were aged 21 to 30 years in the current study, followed by 31 to 40 years.

**Graph 1: Age distribution of patients**



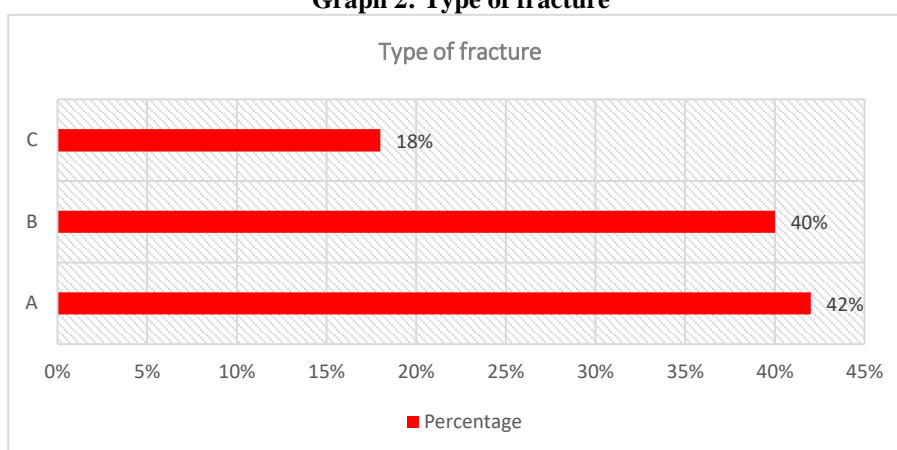
**Gender:** 62% of cases were males.

**Table 1: Gender of patients**



**Type of fracture:** Most of the fractures were type A fracture in AO/OTA classification.

**Graph 2: Type of fracture**



**Laterality and cause of fracture:** Left tibial fractures are more commonly seen and most of the fractures are caused by road traffic accident.

**Table 2: Laterality and cause of fracture**

Parameters	Percentage
Left side	56%
Right side fracture	44%
Road traffic accident as cause	72%
Domestic fall fracture	28%

**Surgery details:**

The mean duration of surgery was 120.2 min.

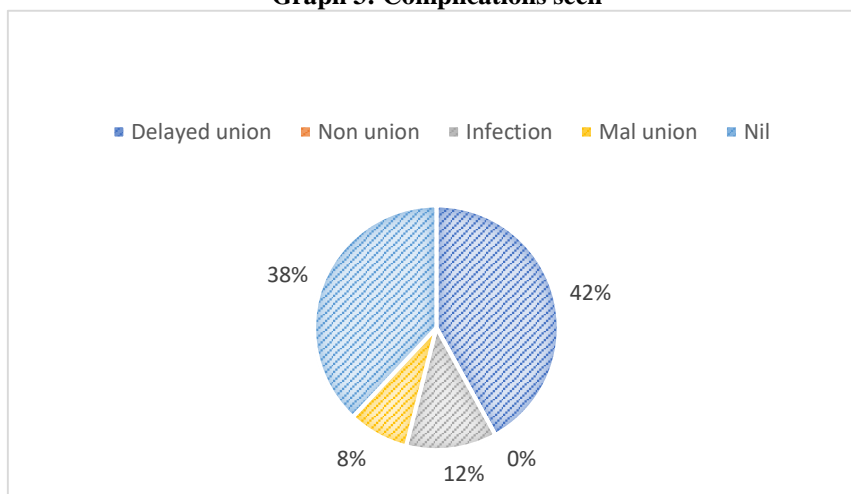
**Table 3: Surgery details of patients**

Parameters	Mean and SD
Mean duration of surgery	120.2±13.1 min.
Mean time for callus formation	15.8±3.2 weeks
Mean time for bone union	23.4±1.4 weeks
Mean delay in operation	3.4±0.9 days

**Complications:**

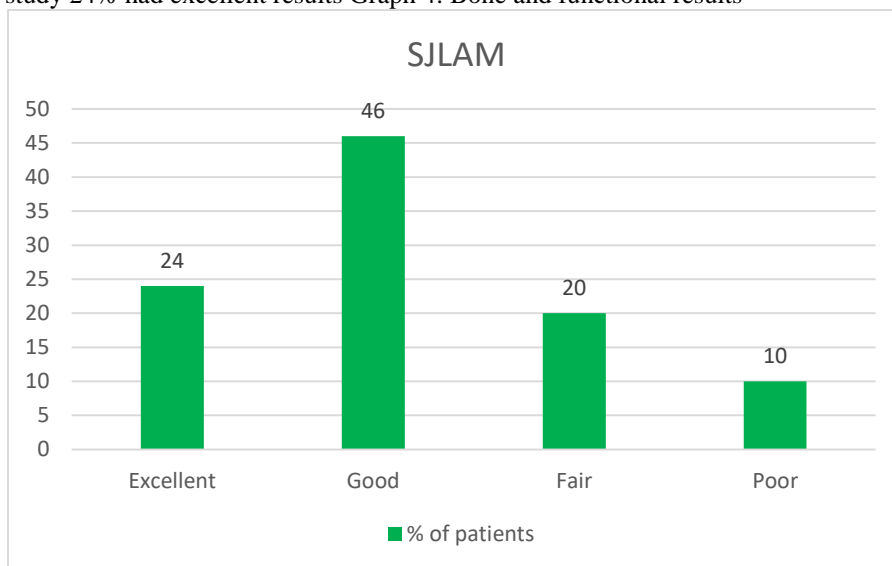
Delayed union was the most common complication seen, followed by infection. Infection got resolved spontaneously. Shortening was not seen in any patient.

**Graph 3: Complications seen**



**Bone and functional results:**

In the current study 24% had excellent results Graph 4: Bone and functional results



**V. DISCUSSION**

In the current study, 50 patients were studied. Most of the patients were males. Most of the patients were aged 21 to 30 years. Most of the patients had type A fracture. Most of the patients had fracture on left side and the most common complication seen was delayed union. Most of the patients showed good outcomes as per SJLAM criteria. Previous studies showed that complex tibial shaft fractures takes more time for healing and possible complications like malunion.<sup>10,11</sup>

In the study done by **Kang et al.**, average JLETS pain score was found to be 8.8 and it ranged from 8 to 10.<sup>12</sup> In our study, pain was not reported. IMN was frequently reported to have malunion commonly compared to MIPO technique in distal tibia fractures as per **Li B et al.**<sup>13</sup>. As per the meta-analysis done by **Hattarki et al.**<sup>14</sup> patients with mid-shaft tibial fractures treated with IMN took around 23 weeks for union, and 25% of patients developed malunion, and 20% showed superficial infection. Their study showed that the mean time for union of fracture as 19.8 weeks.

Our results showed that radiological results show that MIPO technique provided acceptable postoperative outcomes in treating tibial shaft fractures. Mean time for union was 23 weeks in our study and in the studies of **Borg et al.** and **Krackhardt et al.**<sup>15-16</sup> showed the mean time of union was 17 weeks.

## VI. CONCLUSION

MIPO technique can reduce iatrogenic soft tissue injury and damage to bone vascularity and preserving osteogenic hematoma providing good to excellent outcomes. It is considered a reliable approach in treating tibial shaft fractures, especially those which are not suitable for intramedullary nailing. We recommend MIPO technique with LCP to provide stable fixation and good clinical and radiological results.

The study is self-sponsored.

There were no conflicts of interest.

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