

**Analysis of surgical management of extra articular distal 1/3<sup>rd</sup> tibia fractures with mippo, nailing and open plating.**

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**Abstract**

**Introduction:** Distal Tibia fractures continue to be one of the most controversial fractures that we treat. In Plate osteosynthesis for fractures of the distal tibia is often associated with delayed healing, infection, and hardware problems, but with MIPPO [Minimally invasive percutaneous plate fixation] method rate of delayed union and infection rate is come down. Locked intramedullary nailing is the treatment of choice for closed simple diaphysial fractures of the tibia shaft and distal 1/3<sup>rd</sup> .

**Material and Method:** Study consists of 30 patients undergoing fracture distal 1/3rd tibia surgery. Patients operated from January 2018 to June 2021 were included. Study include both retrospective a prospective cases.

**Results:** We have chosen 3 modalities Nailing, plating and MIPPO. No of case were taken randomly.10 cases done with Nailing technique 10 with plating and 10 of

MIPPO. Mean duration in MIPPO was 56.79±5.409 minutes, in NAILING is 85.00± 12.247 minutes, and in Plating was 77.83±12.777 minutes.78% of the patients showed excellent results in our study, and 22% showed good results

**Conclusion :** We treated all the fracture in our study but, minimally invasive plate osteosynthesis (MIPPO) technique using stainless steel Medial Locking compression plate shows a rapid healing by secondary fracture union with few complication and hence achieving strong bone union across the fracture site due to inherent benefits of less tissue damage and minimal disturbance of fracture site biology.

**Keywords:** Distal 1/3<sup>rd</sup> tibia fracture, AO classification, VAS score.

**Introduction**

Extraarticular Distal 1/3rd tibia fracture had been one of the difficult and challenging condition encountered by orthopaedic surgeons in day to day practice. The

subcutaneous location of the anteromedial surface of the tibia with severe bone and soft tissue injury is not infrequent, and there is a high incidence of open fractures compared with other long bones<sup>1</sup>. Since in the past, surgeons had to rely on nonoperative management, and the incidences of non-union, malunion, and joint stiffness were high. Although treatment planning for fracture should be considered individually to achieve the optimal results, the effect of decision must be considered in the light of overall injury status and general condition of the patient. These kind of fractures continue to be one of the most controversial fractures that we treat. Most of the controversy resides in the treatment techniques regarding the choice of implants, as the indication for surgery is fairly clear. Some surgeons treat the fracture based on fracture pattern and level of the fracture, mostly on external fixation if soft tissue injury is found, whereas others use predominately plate fixation and some prefer nailing techniques. These areas of controversy would seem to be an excellent target for prospective clinical research. Surgeons should be warned, however, that there are reasons that answering these questions is exceedingly difficult. Fracture patterns are complex, diverse, and technically demanding and do not lend themselves well to random allocation. In Plate osteosynthesis for fractures of the distal tibia is often associated with delayed healing, infection, and hardware problems<sup>2</sup>. In this study distal metaphyseal tibial fractures were treated by intramedullary nailing, open plating and with minimally invasive plate osteosynthesis [MIPPO].<sup>3,4</sup>

#### **Material and method**

Study consists of 30 patients operated for extraarticular fracture distal 1/3rd tibia surgery were included and after prior informed written consent in our Department.

Duration of the study: Patients operated between January 2018 to June 2021 were included. Study design: Retrospective and Prospective study. [Retrospective study from January 2018 to December 2020, prospective study from December 2020 to June 2021].

**Inclusion Criteria:** Patients having fracture of distal 1/3rd tibia- extraarticular. Patients of both sex & in age groups of above 18 years.

**Exclusion Criteria:** Open fracture, Patients less than 18 years. A previous of either distal tibia. Any other associated fracture. Approximately 8 Cases of distal 1/3rd tibial fracture were evaluated radiologically and managed by various surgical modalities in last years.

**PROCEDURE:** All the patients operated surgically and follow up done using VAS scoring at intervals of 6 weeks, 3 months, 6 months and 1 year. Patients were checked for routine OT profile. Pre-anesthetic evaluation was done for all cases. Parenteral routine antibiotics was given 1 hour prior to surgery. Under tourniquet control fracture site was exposed. Check X-ray was taken fig-1,2 and 3. Parenteral antibiotics were given till second post-operative day and then oral antibiotics till fifth day and on the second day, wound inspection and dressing was done. Suture removal was done on fourteenth day.

#### **Observation**

In our study maximum patients belongs to age group 31-50 (57%) (Table 1, Chart-1). We had done distribution of mean age of patients with sex and find out male population (18) had mean age 35.67 years and female (12) had 40.86 years (Table 2), In both sex left side fracture is more common (57.5%) (Table 3), in male population fracture pattern AO 43A1 type is common and in female AO43A3 is common and overall AO43A3 is common. There were 10 cases

operated with plating procedure, 10 with nailing and 10 with MIPPO. We compare mode of trauma to the fracture pattern in which AO43A2 is common with assault, A3 In fall from height and in RTA patient. A1 In left side and A3 in right side (Table 4). Mean surgery duration with MIPPO is 58.33 minutes, which was significant compare to other two procedure. There is no significance of procedure with time of union (Table 5, Chart-2). Percentage of procedure with result shows 60% excellent with MIPPO, 30% with Nailing, and 20% with plating. There is Significant difference ( $P=0.02$ ) when we compare between the procedure, and MIPPO is More significant.

### Discussion

The present study was undertaken to evaluate the outcome of three surgical modalities [Nailing, plating and minimal invasive plate osteosynthesis, techniques] in the treatment of extraarticular fracture of distal 1/3rd tibia fracture. We evaluated our results and compared with those obtained by various other studies utilizing different modalities of treatment.

**Age/Sex-**In our study, age of the patients ranged from 18 to 70 years (mean age 38.50 years) with the fracture occur most common in the age group of 31-50 years. In study conducted by Krishna et al.<sup>7</sup> study Mean age was 35yr, Kasper w jassen et al.<sup>8</sup> study mean age was 43.3 year. With Krishna et al.<sup>7</sup> study had 60% male patients and 40% female patients. kasper w janssen et al.<sup>8</sup> Had 25% male, 25% female.

**Side affected:** There was 17 (56%) patients with right sided fracture, 13 (43%) patients with left sided fractures. Side distribution in many studies not quoted J J Guo et al.<sup>9</sup> in July 2014 had 54% of left side had taken treatment with nailing and 51% of left side taken treatment with plating.

**Fracture pattern:** Out of 30 cases studied, 7 cases of 43A1 type (30%), 1 cases of 43A2 type (10%), 6 cases of 43A3 type (40%), 1 cases of 43B1 (2.5%), 7 cases of 43B2 type (17.5%),. Khoury A et al.<sup>10</sup> in 2002 Distribution of the fractures according to the AO/OTA Classification was as follows: five patients suffered from a 43A type fracture, six from a 43B type fracture, and 13 from a 43C type fractures. Four of the fractures were open. Mario Ronga et al.<sup>11</sup> in April 2010 used AO classification.

**Duration of fracture union:** All fracture united with all procedure MIPPO technique average time of union of 18.71 weeks which is better than of plating 19.21 weeks and of nailing technique 21.38 weeks. Raiturker ppp et al.<sup>13</sup> (2001) reported that 62.5% cases showed union between 14 and 18 weeks, while 37.5% showed union between 19 and 23 weeks. Average period of union was 17.63 weeks, Oh CW et al.<sup>14</sup> (2003) the mean union time was 15.2 weeks.

**Criteria for assessment:** VAS (Visual Analog Scale) scoring was used in our study. The mean score at 6 weeks post operatively was 20.46, 3 months post operatively was 37.00, 6 months post operatively was 54.20, and 1 year post operatively was 88.10. jurian van dan berg et al.<sup>15</sup> in April 2016 used VAS score in distal tibia fractures. Abhishek et al.<sup>16</sup> In 2018 used VAS score was excellent with MIPPO.

**Complications:** We had 1 (3%) patients with the complication includes superficial infection. ImGi et al.<sup>17</sup> found an average angulation of  $0.9^\circ$  after plating versus  $2.8^\circ$  after IM nailing ( $p=0.01$ ). kasper et al.<sup>8</sup> had malalignment in 2 of the 12 patients (17%) treated with plate and in 6 of the 12 patients (50%) treated with IM nailing ( $p=0.1$ ).

## Conclusion

The above research of 30 patients of both sex group and operated extraarticular AO43A and B patient done with three procedure open plating technique, closed nailing technique and Minimally invasive percutaneous plate osteosynthesis (MIPPO). There is no significance of procedure with time of union. Percentage of procedure with result shows 60% excellent with MIPPO, 30% with Nailing, and 20% with plating. There is Significant difference ( $P=0.02$ ) when we compare between the procedure . MIPPO found to be very effective procedure among as compared to open plating and closed nailing.

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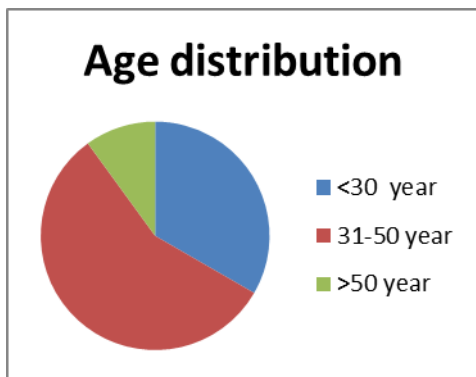
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**Legend Table and Figure**

Table 1 Distribution according to age group.

| Age group in year | No. of cases | Percentage |
|-------------------|--------------|------------|
| <30               | 10           | 32.5       |
| 31-50             | 17           | 57.5       |
| >50               | 3            | 10         |
| TOTAL             | 30           | 100        |



Graph 1: Age distribution chart.

Table 2 Mean Age of Individual Sex

| Age (Years) | Sex    | N  | Mean         | P value |
|-------------|--------|----|--------------|---------|
|             | Male   | 18 | 35.67±12.703 | 0.303   |
|             | Female | 12 | 40.86±6.568  |         |

Table 3: Distribution According To Sex With Side Affected

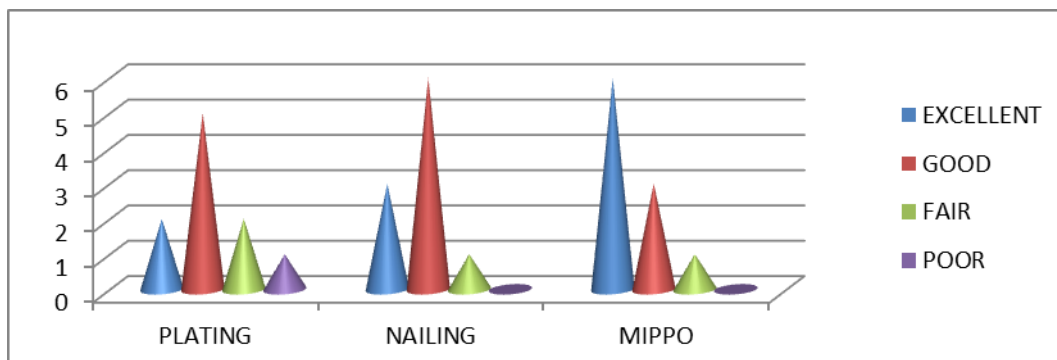
|       |        | Side Affected |       | Total | P value |
|-------|--------|---------------|-------|-------|---------|
|       |        | Left          | Right |       |         |
| SE    | Male   | 10            | 8     | 18    | 0.205   |
| X     | Female | 7             | 5     | 12    |         |
| Total |        | 17            | 13    | 30    |         |

Table 4: Distribution according to fracture pattern v/s side affected

|                  |    | Side Affected |       | Total |
|------------------|----|---------------|-------|-------|
|                  |    | Left          | Right |       |
| Fracture Pattern | A1 | 7             | 3     | 10    |
|                  | A2 | 1             | 1     | 2     |
|                  | A3 | 6             | 6     | 12    |
|                  | B1 | 1             | 0     | 1     |
|                  | B2 | 2             | 3     | 5     |
| Total            |    | 17            | 13    | 30    |

Table 5: Distribution of Results with Procedure.

|           |         | Result |      |      |      | Total |
|-----------|---------|--------|------|------|------|-------|
|           |         | Ex.    | Good | Fair | Poor |       |
| Procedure | Plating | 2      | 5    | 2    | 1    | 10    |
|           | Nailing | 3      | 6    | 1    | 0    | 10    |
|           | MIPPO   | 6      | 3    | 1    | 0    | 10    |
| Total     |         | 11     | 14   | 4    | 1    | 30    |



Graph 2: Distribution Of Results With Procedure.

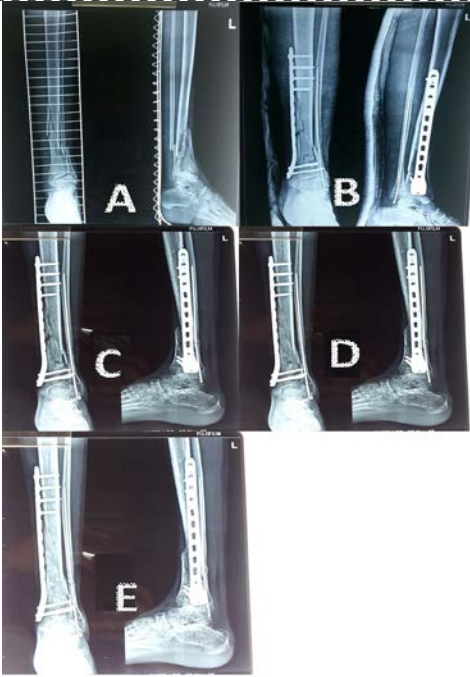


Figure 1: 40 year male operated for distal 1/3<sup>rd</sup> tibia fracture with MIPPO , A- Pre operative x ray, B- post operative x ray, C- 1 month post operative x-ray, D-6 month post operative, E-1 year post operative x-ray.

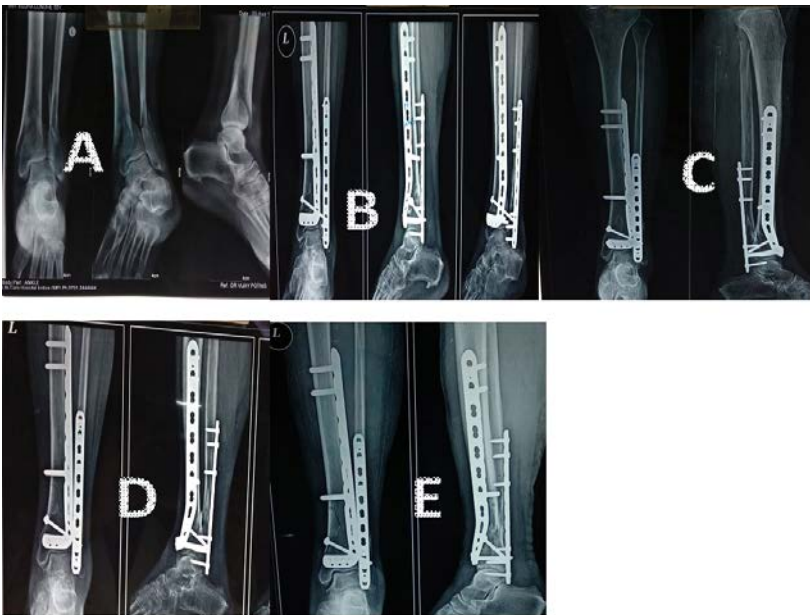


Figure 2: 35 year old female operated for distal 1/3<sup>rd</sup> tibia fracture with open plating. A- Pre operative x ray, B- post operative x ray, C- 1 month post operative x-ray, D-6 month post operative, E-1 year post operative x-ray.

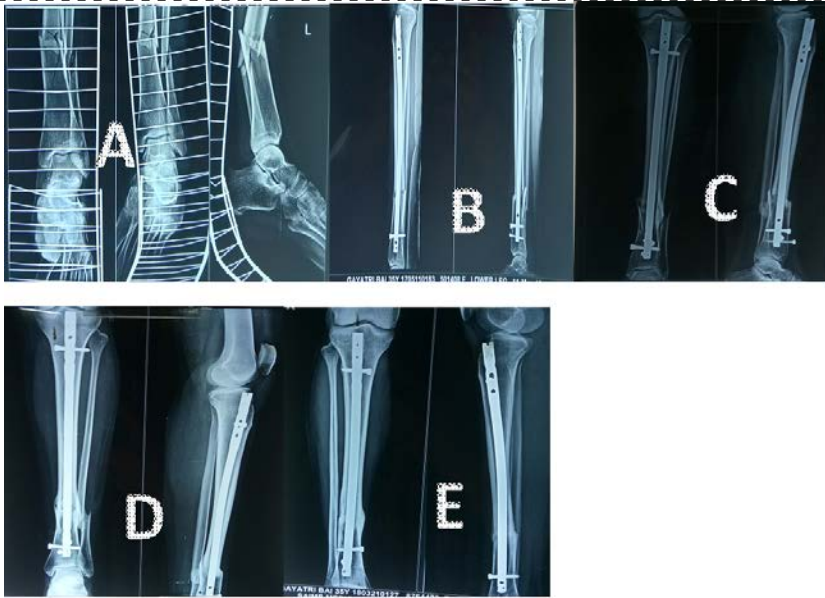


Figure 3: 42 year old female operated for distal 1/3<sup>rd</sup> tibia fracture with closed intramedullary tibia nail. . A- Pre operative x ray, B- post operative x ray, C- 1 month post operative x-ray, D-6 month post operative, E-1 year post operative x-ray.