Analysis of cases of distal tibial fracture managed with MIPPO technique

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Abstract

Background: Fracture of this bone is a challenge for orthopedic surgeons as there is less muscular covering of the bone. This leads to complications such as non-union, delayed union or dehiscence. The present study was conducted to assess the cases of distal tibial fractures in the study population.

Materials & Methods: The present study was conducted on 128 cases of both genders reported to the department. All cases were managed with minimally invasive percutaneous plate osteosynthesis (MIPPO). All were recalled regularly. Routine X-rays were taken such as AP view and lateral view to see the outcome of the treatment. American orthopedics foot and ankle score (AOFAS) ankle-hind foot scale was used for assessing the results. Scores such as excellent (90–100), good (75–89), fair (50–74) and poor (<50) were considered.

Results: Out of 128 cases, males were 68 and females were 60. The difference was non-significant (P>0.05). The mean value of movements such as dorsiflexion was 18.2°, plantar flexion was 48.6°, inversion was 17.2°, and eversion was 16.8°. Mean union time of fractures was 18.4 weeks and follow-up period was 10.4 months. Among various causes, road side accident (RSA) was seen in 112, fall from height in 30 and sports injury in 26 cases. The difference was significant (P<0.05). AOFAS score was excellent in 60 males and 52 females, good in 4 males and 6 females, fair in 4 males and 1 female and poor in 1 females. The difference was significant (P<0.05).

Conclusion: MIPPO is one of the effective and efficient management for distal tibial fracture. Road side accident was the main reason for fracture.

Keywords: Distal tibial fracture, MIPPO, road side accident

Introduction

Tibia is a long bone present in the leg. Fracture of this bone is a challenge for orthopedic surgeons as there is less muscular covering of the bone. This leads to complications such as non-union, delayed union or dehiscence. Among various reasons for fracture of tibia, road side accident (RSA) is common one. Other causes are sports or falls from height. In today’s fast growing life, the living standard has changed. In young adults, fracture which is common in this age group, soft tissue injury is quite common as there are chances of open fracture [1]. AO Muller [2] classified distal tibia fractures as distal tibial metaphyseal injuries without intra-articular extension which can be simple, wedge and complex fracture. It can be partial articular fractures which are further classified as pure split with depression, depression with multiple fragments. Fracture involves the entire joint surface which involves simple split in the articular surface and the metaphyseal articular split that is simple with a metaphysis split that is multi fragmentary, fracture with multiple fragments of the articular surface and the metaphysis.

There are different treatment modalities for distal tibial fractures. External fixation, intramedullary (IM) nailing and plate osteosynthesis are commonly employed for distal tibial fractures. Minimally invasive percutaneous plate osteosynthesis (MIPPO), applied by indirect reduction has been a successful treatment method in cases of lower extremity complex fracture.

Minimally invasive percutaneous plate osteosynthesis is a surgical technique in which percutaneously inserted plate is fixed at a distance proximal and distal to the fracture site through minimal exposure and also blood supply to the fractured fragments is maximally preserved. It aims at flexible elastic fixation to initiate spontaneous healing including induction of callus formation [3]. The present study was conducted to assess the cases of distal tibial fractures in the study population.
Materials & Methods
The present study was conducted in the department of Orthopedics. It comprised of 128 cases of both genders reported to the department. All cases were managed with minimally invasive percutaneous plate osteosynthesis (MIPPO). All patients were informed regarding the study and written consent was obtained. Ethical clearance was taken prior to the study. General information such as name, age, gender etc. was recorded. Patients were treated with MIPPO technique and all were recalled regularly. Routine X-rays were taken such as AP view and lateral view to see outcome of the treatment. American orthopedics foot and ankle score (AOFAS) ankle-hind foot scale was used for assessing the results. Scores such as excellent (90-100), good (75-89), fair (50-74) and poor <50 was considered. Results thus obtained were subjected to statistical analysis using chi-square test. P value less than 0.05 was considered significant.

Results

Table 1: Distribution of cases

<table>
<thead>
<tr>
<th>Total- 128</th>
<th>Males</th>
<th>Females</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>68</td>
<td>60</td>
<td>1</td>
</tr>
</tbody>
</table>

Table I shows that out of 128 cases, males were 68 and females were 60. The difference was non-significant (P-1).

Table 2: Parameters in the study

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value (Mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorsiflexion</td>
<td>18.2°</td>
</tr>
<tr>
<td>Plantar flexion</td>
<td>48.6°</td>
</tr>
<tr>
<td>Inversion</td>
<td>17.2°</td>
</tr>
<tr>
<td>Eversion</td>
<td>16.8°</td>
</tr>
<tr>
<td>Union time</td>
<td>18.4 weeks</td>
</tr>
<tr>
<td>Follow up</td>
<td>10.4 months</td>
</tr>
</tbody>
</table>

Table II shows that mean value of movements such as dorsiflexion was 18.2°, plantar flexion was 48.6°, inversion was 17.2°, eversion was 16.8°. Mean union time of fractures was 18.4 weeks and follow up period was 10.4 months.

Discussion
Distal tibial fractures are common in young adults. The reason is the less muscular coverage of the bone along with poor vascularity. Various treatment modalities have been suggested. Biological plate osteosynthesis is important in bone vascularization. It also aids in decrease infection rate and to improve consolidation [9].

In present study, the cases of distal tibial fractures were analyzed. We out of 128 cases, males were 68 and females were 60. All the patients were recalled to see the treatment outcome. Movements were recorded. The mean value of dorsiflexion was 18.2°, plantar flexion was 48.6°, inversion was 17.2°, eversion was 16.8°. Mean union time of fractures was 18.4 weeks and follow up period was 10.4 months. This is in agreement with Ravindran et al. [5]

MIPPO technique avoids direct exposure of the fracture site and transforms the implants in an internal extramedullary splint. Furthermore, MIPPO was successfully extended to complex tibial fractures, being actually indicated in all long bones complex fractures that are not suitable for intramedullary osteosynthesis [6]. In present study we observed that among various causes, road side accident (RSA) was seen in 112, fall from height in 30 and sports injury in 26 cases.

We also assessed the AOFAs score in all patients. It was excellent in 60 males and 52 females, good in 4 males and 6 females, fair in 4 males and 1 female and poor in 1 females. The difference was significant (P<0.05).

Graph II shows that AOFAs score was excellent in 60 males and 52 females, good in 4 males and 6 females, fair in 4 males and 1 female and poor in 1 females. The difference was significant (P<0.05).

Graph 1 shows that among various causes, road side accident (RSA) was seen in 112, fall from height in 30 and sports injury in 26 cases. The difference was significant (P<0.05).

Graph 2: American orthopedics foot and ankle score (AOFAS)
Indications for internal fixation by MIPPO are as multifragmentary fractures in the metaphysis, simple fractures in the diaphysis and metaphyseal regions and low grade open fracture. Mippo has several advantages which include no need of extensive surgical exposure, improved rates of fracture union, decreased infection rate, decreased need for bone grafting, early mobilization of extremity possible, ideal technique for dealing with multiple injuries, decreased incidence of re fracture after plate removal, decrease use of bone grafting. It minimizes extraosseous blood supply than open plating [10].

Arup et al. [11] in their study, included 42 patients, 21 underwent IMLN and 21 were treated with MIPPO. In IMLN group, average union time was 18.26 weeks and in MIPPO was 21.70 weeks. American Orthopedic Foot and Ankle Society score was 96.67. Average time required for partial and full weight bearing in the nailing group was 4.95 weeks and 10.09 weeks respectively as compared to 6.90 weeks and 13.38 weeks in the plating group. Lesser complications in terms of implant irritation, ankle stiffness, and infection, were seen in interlocking group as compared to plating group. Distal tibial fracture poses challenge and MIPPO has been proved beneficial in managing cases. We did not find any complication in our study. So MIPPO results were useful in present study.

Conclusion
MIPPO is one of the effective and efficient management for distal tibial fracture. Road side accident was the main reason for fracture.

References