Section: Orthopaedics

Original Research Article

SURGICAL MANAGEMENT OF FRACTURE LOWER END OF TIBIA IN ADULTS WITH ANTEROLATERAL PLATE- A PROSPECTIVE STUDY IN RIMS

Surendran[1], Roel Langshong[2], Mikachi Jajao D Shira[3], Bojum Leya[4], Mohit Saini[4], Ambo Jopir[4], Ashique Eangakodan[4]

[1]Registrar, Department of Trauma Surgery, Ganga hospitals private limited Coimbatore, Tamilnadu, India
[2]Assistant Professor, Department of Orthopaedics, Regional Institute of Medical Sciences, Imphal, Manipur, India
[3]Senior Resident, Department of Orthopaedics, Regional institute of medical sciences, Imphal, Manipur, India
[4]Postgraduate Trainee, Department of Orthopaedics, Regional Institute of Medical Sciences, Imphal, Manipur, India

Received : *28/08/2023*
Received in revised form : *24/09/2023*
Accepted : *06/10/2023*

Keywords:
Anterolateral plating fixation distal tibial, fractures, AOFAS.

Corresponding Author:
Dr. Roel Langshong,
Email: roellangshong@gmail.com

DOI: 10.47009/jamp.2023.5.5.270

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (5); 1364-1372

Abstract

Background: Soft tissue healing is of paramount importance in distal tibial fractures for a successful outcome. There is an increasing trend of using anterolateral plate due to an adequate soft tissue cover on anterolateral distal tibia. To determine the anterolateral plating fixation for stability in Valgus pattern distal tibial fractures. **Materials and Methods:** This longitudinal hospital based study was done in the Department of Orthopaedics, RIMS, Imphal, Manipur for a period of 2 calendar years from August 2018 to August 2020. Patients who gave consent for the study and operation, Age more than or equal to 18 years, Extra articular closed fractures of distal one third of tibia and Fractures unfavourable for interlocking nailing were included in this study. **Result:** At the end of 12 months, final AOFAS score was calculated for each patient. 5(16.7%) patients had an Excellent AOFAS score, 17(56.7 %) patients had Good score, 4(13.3 %) patients had acceptable score, and 4 (13.3%) patients had bad score. Out of 30 patients in our study over 2 years of followup period, 14 patients we also had a chance of implant removal after 12 months of operation and for them we have assessed functional outcome after 6 months of implant removal. **Conclusion:** Anterolateral plating has better fixation stability in Valgus pattern distal tibial fractures. With more number of cases in our study results would be more accurate and statiscally more significant.

INTRODUCTION

Distal tibia fractures are commonly known among orthopaedic surgeons as pilon fractures. This term comes from the French word pestle, and was used by anatomist and radiologist Étienne Destot in the year 1911 to describe fracture occurring in distal tibia within 5 cm from the ankle joint line.[1,2] He compared the anatomy of ankle joint to mortar and pestle, where the trochlea plays the role of a pestle, and the distal ends of tibia and fibula are mortar in which talus acts as a hammer, impacting and fracturing the distal tibia. These are intra-articular fractures involving the ankle joint. These fractures may occur due to high or low energy injuries.[3-5] Tibialpilon fractures account for 1% to 10% of all lower extremity injuries.[6] In older patients fracture occurs due to rotational injury which is mostly extra articular with less wound complications.[7] In younger patients most common mode of injury pattern is high energy fractures with axial loading force with or without rotational or angulator forces where talus acts as hammer, in this case fractures are mostly intra articular with wound complication and skin blisters making the treatment more difficult. The position of foot is thought to affect the position of plafond and level of comminution, displacement, metaphyseal disruption. Management of distal tibial fractures has always held a particular interest and formidable challenge for orthopaedic surgeons. Fracture patterns are complex, diverse, and technically demanding and do not lend themselves well to random allocation. For these reasons, new treatment techniques may need to continue to be evaluated in case series and cohort studies. Although surgical stabilization of fractures and early mobilization provides the best clinical outcome, Treatment planning should be considered individually based on the overall injury status and general condition of the patient. Various method of treatment includes Casting, Calcaneal pin traction, ORIF with plates and screws, external fixation,

ISSN (O): 2687-5365; ISSN (P): 2753-6556

intramedullary nailing. 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.[8] Fractures of distal tibia are unique that in it is located subcutaneously with decreased muscular cover and the consequent decreased vascularity leads to complications like delayed union and wound complications such as wound dehiscence and infections, malunion.[6] Conservative treatment of these fractures quite often results in a number of complications including limb shortening, malunion, nonunion and ankle stiffness, thus augmenting the need of surgical approaches. Internal fixation was considered gold standard in 1980s by Ruedi of the AO group.[9] Management methods has shifted from acute fixation to delayed fixation and provide sufficient time for soft tissue healing and prevent short term complications.

MATERIALS AND METHODS

This longitudinal hospital based study was done in the Department of Orthopaedics, RIMS, Imphal, Manipur for a period of 2 calendar years from August 2018 to August 2020.

Inclusion criteria

- Patients who gave consent for the study and operation
- Age more than or equal to 18 years
- Extra articular closed fractures of distal one third of tibia
- Fractures unfavourable for interlocking nailing
- Patients medically fit for surgery

Exclusion criteria

- Pathological fractures
- Compound distal tibial fractures of type 1, type 2 and 3A, 3B, 3C according to Gustilo and Anderson classification
- Fractures with neurovascular injury
- Preexisting impairment of function of same limb
- Patients with other comorbidities or associated fractures which may influence the outcome
- Compartment syndrome or other such associated fractures which may influence the outcome

Procedures

Method of collection of data

Patient's data was collected using a proforma which consists of following questionnaire -

Socio-demographic data of patient like age, sex, address, Follow up clinical and radiological data of patient like working capacity, range of motion, and pain.

The management of the injury was based on the following protocol:

- Initial management and resuscitation
- The patients were received in the emergency and his vital parameters was recorded & monitored
- Associated limb, chest, abdomen and head injury was ruled out
- If there was an open wound/ type 1 open fracture, an intravenous line was established, tetanus prophylaxis and I/V cephalosporin antibiotics was given, fluid replacement was given and hemorrhage from the wound was controlled by pressure bandage. The wound over the fracture site was cleaned and dressed. Other wound, if any, was taken care of appropriately
- An above knee slab was applied by simply aligning the bone and some were given calcaneal pin traction if severe swelling and blisters were present, till wound has healed. Patients were taken up for surgery after the initial swelling and blisters has resolved and after the appearance of wrinkle sign
- The patient once settled from the acute injury, was shifted to the orthopaedic ward. Preoperative assessment and planning had been initiated on admission in the ward, where we took detailed history, noting the mode and severity of the injury, extent and type of the trauma to the tissues and detailed examination of the affected extremity. Skiagrams was studied in detail so as to classify the fracture. The case was then examined by a senior consultant and requirement for surgery was assessed. If the consultant opined for surgery, the case was included in the study

Operative Technique

Positioning: The patient was operated under spinal or regional anesthesia and antibiotics prophylaxis were given 1 hour before induction of anesthesia. Patient was placed in the supine position. Elevate the leg on a padded rest with the knee moderately flexed to the placement in a neutral position. Place the opposite leg level on table top. Surgical site was prepared with 10% betadine solution and draped. A tourniquet will be applied to affected lower limb as proximal as possible.

Surgical approach for anterolateral plate fixation: Anterolateral approach was used to reach the fracture site. The skin incision is oriented longitudinally and in line with 4th ray and travels over anterolateral aspect of distal tibia. The full thickness flaps is raised and superficial peroneal nerve beneath the skin is protected and retracted to explore the underlying anterolateral aspect of distal tibia. This best preserves the vascularity of distal tibia. The fracture segment temporarily stabilized with k wires to attain stable reduction and was checked under image intensifier control. Then anatomically precontoured anterolateral plate is then placed over distal tibia taking due care for implant placement relative to ankle joint lying. Plate holding reduction clamps are used along with k wires to align the head of plate to the bone. Distal tibial locking screws of size 4.5 mm was passed first followed by more proximal screws and then will place the far distal 2.7 mm screws accordingly. Lag screws if needed were applied either through free hands or through plates. Wound was closed in layers with negative suction drain

ISSN (O): 2687-5365; ISSN (P): 2753-6556

insitu. Skin is closed with non-absorbable monofilament sutures and post-op below knee back slab is applied with bulky dressing. Posterior slab was continued post operatively for 2-3 weeks depending upon soft tissue healing.

Post operative management: Postoperatively, the limb is placed in to a bulky dressing from the distal metatarsal region to above knee and active toe movements encouraged. Immediate postoperative radiograph was taken and compared with pre operative radiograph. A cephalosporin antibiotic is administered for 24-48 hours after surgery. The patient was watched for excessive swelling, pain and distal circulation. A suction drain is maintained at least for 24 hours until the drainage is less than 30 ml per 8-hour drainage. Dressings were done on postoperative day 2. For patients with no soft tissue complications suture removal was done on postoperative day 10. Below knee slab is applied for 2-3 weeks post surgery depending upon soft tissue healing. During these period active toe movements, Hip movements were encouraged. If the skin condition is good, Suture removal is done on the 10th day and patient is discharged home. Advice regarding partial weight bearing and full weight-bearing was given on the basis of pain and the stability of the fracture fixation.

Figure 1 Anterolateral Skin Approach for Anterolateral Plating

Figure 2: Lag screw placement after fracture reduction

Figure 3: Pre contouring the plate according to fractured tibial anatomy

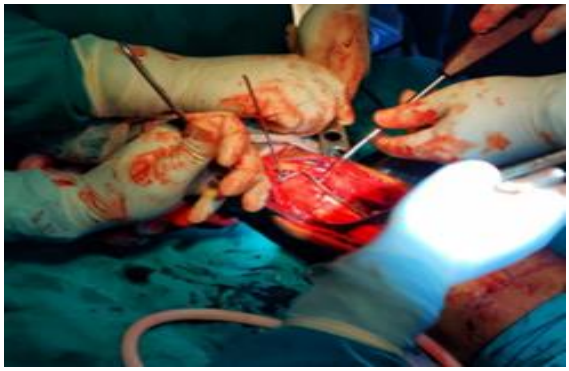

Figure 4: Fixation of plate to tibia with k wires and screws

Figure 5 Intra operative fluoroscopic confirmation of reduction and screw placement

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Figure 6: Preoperative radiograph of distal tibial fracture – AO/ATA 43 A1

Figure 7: postoperative xray at 1 month followup

Figure 8: plate removal after fracture union

Figure 9: Remnant screw holes after implant removal

Figure 10: Implants removed

RESULTS

A total of 30 patients who had distal tibial fractures and got treated through anterolateral plating approach were included in the study as per the inclusion criteria. In the present study 10 (33.3%) patients were 18 - 30 years old, 6 (20.0%) were 31 - 40 years old and another 8(26.7%) were 41 - 50 years old. Of the remaining 6 (20.0%) were 51 - 60 years old as shown in fig. 21. The mean age being 39 years. There were 21 (70.0%) males and 9 (30%) females in the present study. Ratio of males to females was 2.3: 1 in our study. In the present study Road Traffic Accident (RTA) was the most common mode of injury accounting for 17 (56.7%) cases, slip and fall accounted for 8 (26.7%) cases and fall from height accounted for 3 (10.0%) of the cases. 2 patient (6.7%) presented with fracture after assault. In the present study Standard AO Classification system were used to classify a fracture which comes under inclusion criteria. Of these 11 (36.7 %) patients had type 43 A1, 3 (10.0 %) patients had type 43 A2 and 16 (53.3 %) patients had severely comminuted extra articular type 43 A3.

In our study, 17 (56.7 %) had right sided injury and 13 (43.3 %) had left sided injury.

The mean interval between injury and surgery in our study is 9.5 days. In our study, we had 8 (26.7%) patients for whom we operated less than 6 days. 12 (40.0%) patients had been operated between 6 – 12 days from the time of injury. 10 (33.3%) patients had been operated after 12 days from time of injury due to severe soft tissue swelling and other local complications. In the present study, duration of surgery was <60 minutes in 10 (33.3%) cases, 60- 90 minutes in 11 (36.7%) cases, 90- 120 mins in 6 (20.0 %) and >120 minutes for 3 (10.0%) cases. In our study, 24 (80.0 %) patients had blood loss of < 50 ml, 5 (16.7 %) had blood loss of 50 – 100 ml and of the rest 1 (3.3 %) patients had blood loss of > 100 ml which is very minimal and doesn't require further blood transfusion. In the present study, supported partial weight bearing walking was started in 7 weeks by 15 (50%) patients. At 8 weeks 12 (40.0%) patients and above 8thweek by 3(10.0%) patients. The mean time for starting partial weight bearing in our study

ISSN (O): 2687-5365; ISSN (P): 2753-6556

was 7.26 weeks. In the present study unsupported full weight bearing walking was started less than 17 weeks for 2 (6.7%) of the patients, at 18-21 weeks in 20 (66.7%) patients, at 22-24 weeks 4 (13.3%) patients and at >24 weeks 4 (13.3%) patients. The mean time for starting full weight bearing was 20.39 weeks. In our study, time for full weight bearing is considered to be time for clinically complete union. In our study, radiologically acceptable outcomes includes the fracture union with <5º of angulation in both sagittal and coronal plane, less than 1cm shortening, with articular step <2mm. we have used the Teeny and Wiss score to assess quality of immediate post-operative reduction.

In our study, we got Anatomic reduction for 12 (40.0 %) patients, Good reduction for 15 (50.0 %) patients, Fair reduction for 2(6.7 %) patients, and Poor reduction for 1 (3.3 %) patients. In our study, The American Orthopaedic Foot & Ankle Society (AOFAS) scale was used to assess the functional outcome. This scale consists of subjective and objective variables classified in to three major categories: pain (40 points), function (50 points), and alignment (10 points).

Total score functional outcome:

>89 points – excellent

80- 89 points – good

70 – 79 points – acceptable

≤ 69 points – bad

At the end of 12 months, final AOFAS score was calculated for each patient. 5(16.7%) patients had an Excellent AOFAS score, 17(56.7 %) patients had Good score, 4(13.3 %) patients had acceptable score, and 4 (13.3%) patients had bad score. [Table 2]

Out of 30 patients in our study over 2 years of followup period, 14 patients we also had a chance of implant removal after 12 months of operation and for them we have assessed functional outcome after 6 months of implant removal. [Table 3]

There were 2 (6.7%) patients who had delayed-union and required secondary procedure in the form of dynamization and had achieved union. There were no cases of non union. The 1 case of superficial wound infection was managed by local wound care and intravenous antibiotics (cefoperazone and sulbactam) over 5 days continued by oral clindamycin (300 mg twice daily) for next 5 days. Knee stiffness, ankle stiffness and calf muscle atrophy was managed by appropriate physiotherapy supervised by a designated physiotherapist of the hospital. The 3 (10.0%) patients are with vargus angulation of <5º, 3 (10.0%) are with valgus angulation <5º and 5 (16.7%) are with sagittal angulation <6º. All were asymptomatic but was instituted physiotherapy. There was no case of implant breakage or exposure of implant outside the skin in the present study. [Table 4]

Table 1: Type of fracture distribution (N = 30)

Type of fracture distribution	n	%
Type 43A1	11	36.7
Type 43A2	3	10.0
Type 43A3	16	53.3

Table 2: Functional outcome and Radiological outcome (N = 30)

AOFAS scale (functional outcome)	Outcome	n (%)
>89	Excellent	5 (16.7)
80 – 89	Good	17 (56.7)
70-79	Acceptable	4 (13.3)
≤ 69	bad	4 (13.3)
Teeny and Wiss score (Radiological Outcome)	outcome	No. of cases
9	Anatomic	12 (40.0)
10-12	Good	15 (50.0)
13-16	Fair	2 (6.7)
>16	Poor	1 (3.3)

Table 3: AOFAS Score after implant removal (N = 30)

Aofas scale (functional outcome)	Outcome	n (%)
>89	Excellent	6 (42.9)
80 – 89	Good	5 (35.7)
70-79	Acceptable	2 (14.3)
<69	bad	1 (7.1)

Table 4: Complications in the study (N = 30)

Complications	Infections n (%)	Varus angulation n (%)	Valgus angulation n (%)	Sagittal angulation n (%)	Delayed union n (%)	Non union	Implant breakage
Our study	1 (3.3)	3 (10.0)	3 (10.0)	5 (16.7)	2 (6.7)	-nil-	-nil-

Table 5: comparison between age in years and final AOFAS score (N = 30)

Age in Years	Mean AOFAS Score ± SD	p- Value
18-30	77.60 ± 9.216	0.053
31-40	87.83 ± 5.193	

ISSN (O): 2687-5365; ISSN (P): 2753-6556

41-50	80.25 ± 7.760	
51-60	85.17 ± 4.622	

There was no statiscally significant association between Age in years and final AOFAS score in the present study.

Table 6: Comparison between Age in years and Infection (N = 30)

Age in Years	Infection		Total n (%)	p- value*
	Present n (%)	Absent n (%)		
Less than equal to 40	1(6.3)	15(93.8)	16 (100)	1.000
More than 40	0(0)	14(100.0)	14 (100)	
Total	1(3.3)	29(96.7)	30 (100)	

There was no statiscally significant association between Age in years and Infection in the present study.

Table 7: Comparison between gender and Final AOFAS Score (N = 30)

Gender	Mean AOFAS Score ± SD	p- value
Male	81.86 ±8.587	0.992
Female	81.89 ± 7.373	

There was no statiscally significant association between gender and final AOFAS score in the present study.

Table 8: comparison between AO classification and final AOFAS score (N = 30)

AO Classification	Mean AOFAS Score ± SD	p- value
43- A1	85.64 ± 8.406	0.147
43- A2	81.00 ± 3.464	
43- A3	79.44 ± 7.857	

There was no statiscally significant association between AO classification and final AOFAS score in the present study.

Table 9: comparison between AO classification and infection (N = 30)

AO Classification	Infection		p- value*
	Present n (%)	Absent n (%)	
43- A1	0(0)	11(100)	1.000
43- A2 & A3	1(5.3)	18(94.7)	

There was no statiscally significant association between AO classification and infection in the present study.

Table 10: comparison between mode of injury and final AOFAS score (N=30)

Mode of injury	Mean AOFAS Score ± SD	p- value
RTA	83.12 ± 8.710	0.580
FALL FROM HEIGHT	80.50 ± 8.089	
SLIP AND FALL	76.67 ± 6.658	
OTHERS	84.50 ± 3.536	

There was no statiscally significant association between mode of injury and final AOFAS score in the present study.

Table 11: Comparison between interval from injury to surgery and infection (N=30)

Interval from Injury to Surgery	Infection		p- value*
	Present n (%)	Absent n (%)	
Less than or equal to 12 days	1 (5)	19(95)	1.000
More than 12 days	0 (0)	10 (100)	

There was no statiscally significant association between interval from injury to surgery and infection. There was no statiscally significant association between duration of surgery and radiological score.

Table 12: Comparison between AO classification and partial weight bearing (N=30)

AO Classification	Mean Partial weight bearing (in days) ± SD	p- Value
43- A1	46.82 ± 4.167	0.103
43- A2	49.00 ± 5.292	
43- A3	53.94 ± 10.446	

There was no statiscally significant association between AO classification of fractures and early partial weight bearing.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 13: Comparison between AO classification and full weight bearing (N=30)

AO Classification	Mean full weight bearing (in days) ± SD	p- Value
43- A1	137.82 ± 10.907	0.471
43- A2	138.00 ± 9.644	
43- A3	147.00 ± 25.174	

Table 14: Mean fracture union time for various studies

Study	Mean Fracture Union in weeks
Devendra Lakhotia et al,[11]	18
Rohit Varma et al,[14]	18
Padmanaban Kosalaraman et al,[10]	21.4
Ronga et al,[16]	22.3
Krzysztof Piatkowski et al,[15]	19

Table 15: comparison of mean AOFAS score of various studies (N=30)

Study group	Mean AOFAS Score at union
Padmanaban K et al,[10]	79.16
Collinge et al,[12]	85
Guo et al,[13]	83.9
present study	81.87

Table 16: comparison of complications of various studies with our study (N=30)

Study group	Infection n (%)	Varus angulation n (%)	Valgus angulation n (%)	Sagittal angulation n (%)	Delayed union n (%)
Padmanaban K et al,[10]	16	4	4	12	-
Devendra Lakhotia et al,[11]	12	-	-	-	-
Ronga et al,[16]	14.7	14.3	4.7	9.5	-
Ajeet Dhakar et al,[17]	8	4	-	-	-
Our Study	3.3	10.0	10.0	16.7	6.7

There was no statiscally significant association between AO classification of fractures and early full weight bearing. There was no statiscally significant association between early partial weight bearing and final AOFAS score. There was statiscally significant association between early full weight bearing and good final AOFAS score. In post- hoc test analysis there was significant difference in final AOFAS score for patients who had full weight bearing after 24 weeks from others who had full weight bearing less than 24 weeks. There was no statiscally significant association between varus angulation and complete union. There was no statiscally significant association between varus angulation and complete union. There was no statiscally significant association between valgus angulation and complete union.

DISCUSSION

Management of distal tibial fractures has always held a particular interest and formidable challenge for orthopaedic surgeons. Subcutaneous location of tibia makes it prone for high incidence of open fractures compared to other long bones. It is more prevalent among young population of country and thus in turn affects the productivity of community. Due to increase in motor vehicles, incidence of distal tibial fractures will also be more common in near future. Usually distal tibial fractures are associated with high energy axial loading force or low energy rotational force and usually associated with more communition and intra articular fragments which in turn leads to more soft tissue swelling and wound infection.

Mode of treatment of distal tibial fractures has shifted from immediate ORIF which lead to more complications like infection, osteomyelitis, implant failure, delayed union. Recently, soft tissue respect is given and surgeries are delayed until skin swelling subsides (wrinkle sign) appears. Anterolateral plate is recent advancement instead of conventional anteromedial plating and further added to advantages are better chaput fragment capture by anterolateral plate and valgus pattern fracture stability is increased by anterolateral plate. MIPPO is the best technique for treating distal tibial fractures. In our study since most of the cases had soft tissue swelling and we waited for soft tissue swelling to subside, MIPPO seems to difficult in most of the cases for reduction and plating technique by MIPPO technique and hence we have to open the case.

Although radiographs are the basic investigation, they are always not adequate and computed tomography (CT) scan which is a more accurate tool is needed for better understanding of fracture anatomy and surgical planning.

In our study mean age of the patients who had got distal tibial fracture was 39.03 years old. We found that 21(70.0%) of the patients in our study were males and the rest 9 (30.0%) females, and the ratio was 2.25:1. Padmanaban K et al10 have found a similar ratio of male: female ratio of 2.3:1. The relative higher incidence of males may be due to the fact that they are involved more in outdoor activities and RTA is more common in them.

Right side 17 (56.7%) was the most common involved side in our study compared to left side 13 (43.3%). Schatzker J et al,[7] have found a similar

ISSN (O): 2687-5365; ISSN (P): 2753-6556

observation of Right side was the more common side involved than the left side.

RTA was the most common mode of injury accounting for 17 (56.7%) cases, slip and fall accounted for 8 (26.7%), fall from height accounted for 3 (10.0%) cases. 2 patient (6.7%) presented with fracture after assault. In studies conducted by Lakhotia D et al,[11] Padmanaban K et al,[10] and Schatzker J 7 et al also found a similar result in which RTA is the most common mode of injury.

In our study the mean duration of days from injury to surgery is 9.53 days until soft tissue swelling subsides and then we operated. 12 patients (40.0%) had got operated between 6-12 days. 8 (26.7%) patients had got operated within 6 days from time of injury. Remaining 10 (33.3%) patients had got operated after 12 days from time of injury. In a study conducted by Collinge C et al,[12] same interval was 7 days and in study conducted by Padmanaban K et al,[10] had a similar observation of mean duration from time of trauma to surgery was 12 days.

In our study 11 (36.7%) had got operated between 60 – 90 minutes. Remaining 10 (33.3%) and 6 (20.0%) had got operated less than 60 minutes and between 90 – 120 minutes respectively. Rest 3 patients (10.0%) for whom operation had got extended more than 2 hours were due to difficulty in reduction and other minor complications.

The decision regarding postoperative weight bearing was done with clinical and radiological outcomes. In our study weight bearing with crutches was allowed only after clinical signs and radiological signs such as callus appearances in three out of four cortices were seen. In our study partial weight bearing was started between 6-7 weeks in 15 (50%) patients, between 7 – 8 weeks in 12 (40.0%) and for the rest 3 (10%) patients it is started after 8 weeks. This is in comparable with the study conducted by Guo J J et al,[13] who started patial weight bearing for his patients by 6 – 8 weeks. In a study conducted by Padmanaban K et al,[10] they started partial weight bearing by 12 – 16 weeks.

The normal postoperative alignment was assessed using Radiological score (Teeny and Wiss). In our study we got 15 (50%) patients had got good alignment, 12(40.0%) had got Anatomic alignment, 2 (6.7%) patients had got Fair alignment and rest 1 (3.3%) had poor alignment. It is comparable to study conducted by Padmaban K et al.[10]

The mean time for complete union is considered to be the time when patient started full weight bearing without any pain or any complications. In our study mean time for full weight bearing was 20.39 weeks. 20 (66.7%) patients started full weight bearing by 18 – 21 weeks, 4 (13.3%) patients by 22-24 weeks, 2 patients (6.7%) started early weight bearing in time less than 17 weeks, rest 4 patients (13.3%) had union after 24 weeks. Devendra Lakhotia et al,[11] and Rohit Varma et al,[14] also had similar observation.

In our study, mean AOFAS Score at complete union was 81.87. We got Good AOFAS Score for 17 (56.7%) patients, Excellent AOFAS Score for 5 (16.7%) patients, Acceptable AOFAS Score for 4 (13.3%) patients and remaining 4(13.3%) had Bad AOFAS Score. This is comparable with other studies conducted by Padmanaban K et al, Collinge et al and Guo et al.[10,12,13]

In our study, we had 1 (3.3%) patients had superficial infection for which i.v. antibiotics treatment given and got settled. 3 (10.0%) patients had Varus Angulation of < 5º, 3 (10.0%) Patients had Valgus Angulation of less than 5º, 5 (16.7%) patients had Sagittal Angulation with Convexity Posteriorly for which we got Good AOFAS Score with Physiotherapy management and there is no clinical deformity seen in those patients. Out of 30 patients we had 2 (6.7%) patients of delayed union.

CONCLUSION

Anterolateral plating has better fixation stability in Valgus pattern distal tibial fractures. With more number of cases in our study results would be more accurate and statiscally more significant.

REFERENCES

1. Jacob N, Amin A, Giotakis N, Narayan B, Nayagam S, Trompeter AJ. Management of high-energy tibialpilon fractures. Strategies Trauma Limb Reconstr 2015 Nov 1;10(3):137-47.
2. Martín OF, Acosta PZ, Castrillo AV, Martín Ferrero MA, De la Red Gallego MA. Tibialpilon fractures. JS M Foot Ankle 2016;1(1):1001-4.
3. Ballal A, Rai HR, Shetty SM, Mathias LJ, Shetty V, Shetty A. A prospective study on functional outcome of internal fixation of tibialpilonfractures with locking plate using minimally invasive plate osteosynthesistechnique. J clinDiagn Res: JCDR 2016 Jan;10(1):RC01-4.
4. Al Ș, Obadă B, Turcu R, St A, Botnaru V Distal tibial fracture treated by minimally invasive plate osteosynthesis after external fixation Retrospective clinical and radiographic assessment. ARS MedicaTomitana 2014 Feb 1;20(1):44-9.
5. Topliss CJ, Jackson M, Atkins RM. Anatomy of pilon fractures of thedistal tibia. J Bone Joint Surg Br 2005 May;87(5):692-7.
6. Sirkin MS. Plating of tibialpilon fractures. Am J Orthop-BELLE MEAD 2007 Dec;36(12):13-7.
7. Schatzker J, Tile M, Axelrod TS. The rationale of operative fracture care. Berlin: Springer; 2005 May 24.
8. Holagundi L, Deepak S, Dayanad , Ramachandra. Functional Outcome with Surgical Management in Distal Tibia Fracture. J Dent Med Sci 2014;13(5):83-90.
9. Rüedi TP, Allgöwer M. The operative treatment of intra-articularfractures of the lower end of the tibia. ClinOrthopRelat Res 1979 Jan 1;(138):105-10.
10. Padmanaban K, Kamalanathan M, Palaniswamy B, Ramasamy V, CyriacAP. Prospective study of distal tibia fracture with anterolateral plating by MIPPO. Indian J Orthop 2017;3(2):153-9.
11. Lakhotia D, Sharma G, Khatri K, Kumar GK, Sharma V, Farooque K. Minimally invasive osteosynthesis of distal tibial fractures using anterolateral locking plate: Evaluation of results and complications. Chin J Traumatol 2016 Feb 1;19(1):39-44
12. Collinge C, Kuper M, Larson K, Protzman R. Minimally invasive plating of high-energy metaphyseal distal tibia fractures. J Orthop Trauma 2007Jul 1;21(6):355-61
13. Guo JJ, Tang N, Yang HL, Tang TS. A prospective, randomised trial comparing closed intramedullary nailing with percutaneous plating in the treatment of distal metaphyseal fractures of the tibia. J Bone Joint Surg Br2010 Jul;92(7):984-8

ISSN (O): 2687-5365; ISSN (P): 2753-6556

14. Varma R, Rai SK, Arora NC, Sharma B, Wani SK. Management of comminuted distal metaphysealtibial fractures with 3.5 mm anatomical anterolateral locking compression plate: A study of 34 cases. Int J OrthopSci 2017;3:780-4
15. Piątkowski K, Piekarczyk P, Kwiatkowski K, Przybycień M, ChwedczukB. Comparison of different locking plate fixation methods in distal tibia fractures. IntOrthop 2015 Nov 1;39(11):2245-51
16. Ronga M, Longo UG, Maffulli N. Minimally invasive locked plating of distal tibia fractures is safe and effective. ClinOrthopRelat Res 2010 Apr 1;468(4):975-82
17. Dhakar A, Annappa R, Gupta M, Harshwardhan H, Kotian P, Suresh PK. Minimally invasive plate osteosynthesis with locking plates for distal tibia fractures. J clinDiagn Res: JCDR 2016 Mar;10(3):RC01

ISSN (O): 2687-5365; ISSN (P): 2753-6556