

*Research Article***Managment of distal tibia fractures using anterolateral plating****Abdelwahab. A. Abdelwahab, Ibrahim El-hawary, Mohammed Y. Hassan, and Asem M. nour el-din**

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Abstract

Objective: Unstable fractures of the distal tibia with or without intra-articular fracture extension can present a management dilemma. Therefore, some authors advocate the use of plates in order to treat fractures involving the distal quarter of the tibia . the medial plating is at high risk of wound problems and nonunions. Lateral plating using a anatomical anterolateral plating through a single lateral approach for treating distal tibial and fibular fractures has been reported to have good results , evaluation of this method was done in this study. **Patients and Methods :** From March 2015 and March 2016a prospective study was undertaken to assess the management of closed distal tibial fractures (type A,B) using Anatomical anterolateral distal tibial plate . all cases were managed at Minia University Hospital. All cases returned for follow up (range from 6 to 12 months) with an average of 9 months. **Results:** the material of This study included 20 patients , 14 males and 6 females , the right side was affected in 10 patients while the left was affected in 10 patients. According to Modified Functional Evaluation System by Karlstrom-Olerud(Refshauge KM 2006). the clinical results were graded as excellent in four patients (20%), good in thirteen patients (65 %), fair in two patients (10 %), & poor in one patient (5 %).The excellent and good results were considered as satisfactory ones while the unsatisfactory included the fair and the poor results. Thus, satisfactory results were found in 17 patients (85 %), and the unsatisfactory ones were found in 3 patients (15 %)

Conclusion: The results of this study agreed that treatment of distal tibial fractures using Anatomical anterolateral distal tibial plate is a safe and excellent method alternative to medial plating technique as it provide greater preservation of the soft tissue, restore the normal anatomy and reduces varus/valgus or rotational deformity and lesser complications as metalwork irritation, infection and wound breakdown.

Keywords: Distal tibial fractures , anterolateral plate , anterolateral approach , open reduction internal fixation

Introduction

Unstable fractures of the distal tibia with or without intra-articular extension can present a management dilemma. Traditionally, there have been a variety of methods of management described and high rates of associated complications reported. Non-operative treatment can be technically demanding and may be associated with joint stiffness in up to 40% of cases as well as shortening and rotational malunion in over 30% of cases^(1,2)

Locked intramedullary nailing is the gold standard for treating fractures of the tibial shaft^[3]. This technique is known to be difficult when treating fractures that involve either the proximal or the distal quarter of the tibia, although Nork's work (2006) proved that intramedullary nailing is an effective alternative

for the treatment of distal tibial fractures^[4,5]. In distal fractures, adequate reduction is difficult to obtain and difficult to maintain with an intramedullary nail, due to metaphyseal widening of the tibia associated with a long lever arm. Therefore, some authors advocate the use of plates in order to treat fractures involving the distal quarter of the tibia .^[6,7]

Open reduction and plating is a popular method that can result in good fixation and retention of the achieved position. The usual approach for open plating is anterior.^[8] Although it offers good exposure to the tibia, the medial plating is at high risk of wound problems and nonunions.^[9,10] Lateral plating using a single lateral approach for treating distal tibial and fibular fractures has been reported to have good results;

however, most of these studies were small series.^[11,12]

Anterolateral plating of distal tibia show many benefits like:

- Anterolateral approach
Lee et al., (2009) found that wound necrosis and nonunion were common in the medial plating group (12.2%), but unusual in the lateral plating group (2.6%).⁽¹³⁾ Single anterolateral approach for combined distal tibia and fibular fractures has been advocated in several studies^[12-13].
- Benefits of the plate itself
Anterolateral anatomical locking Distal Tibia Plate has many benefits like :
 - Distal locking screws provide support for the articular surface
 - Targeted locking for Volkman's triangle and the Chaput fragment
 - 60° twist in shaft is contoured for the distal tibia anatomy: less plate contouring is required
 - Can be used in Extra-articular and simple intra-articular distal tibia Fractures or Distal tibia fracture extending into the diaphyseal area
- Decreased symptomatic hardware problems
Lee et al., (2009) found that In the lateral plating group, only 5.1% of patients reported symptomatic hardware problems and 20.5% asked to have the hardware removed while In the medial plating group, 42.9% of patients reported feeling the plates and screws. 75.5% of patients asked to have the hardware removed⁽¹⁴⁾

The aim of this study is to prospectively assess the outcome of management of closed distal tibial fractures (AO/ type A,B) with anterolateral plate with (6-12 months) follow up to assess the feasibility, safety and outcome of this plate in managing fractures of the distal tibia.

Patients and methods

From March 2015 and March 2016 a prospective study was undertaken to assess the

management of closed distal tibial fractures (type A, B) using Anatomical anterolateral distal tibial plate. The material of This study included 20 patients, 14 males and 6 females, the right side was affected in 10 patients while the left was affected in 10 patients. All cases were managed at Minia University Hospital.

All cases returned for follow up (range from 6 to 12 months) with an average of 9 months.

Initial management is usually directed toward general patient stabilization according to Advanced Trauma Life Support (ATLS), these efforts should be taken prior to any definitive treatment. Fracture splinting with above knee slab, wound care and screening radiography was done first.

In this study we used the AO classification. It gives a precise anatomic description of the fracture. It also serves as a basis for treatment and for evaluation of the results. According to the AO classification we have twelve cases type A1, five cases type A2, three cases type A3,

We used anterolateral approach of distal tibia in this study. The Anterolateral anatomical locking distal tibial plate used in this study was designed according to the anatomical features of the anterolateral surface of the distal tibia of healthy adults.

All the patients were assessed at the time of final follow up using certain scoring systems.

Clinical evaluation

At last follow-up, we evaluated the functional outcome using the Modified Functional Evaluation System by Karlstrom-Olerud (Refshauge KM 2006). In this system, the clinical outcomes including subjective and objective results are evaluated. Clinical results were graded as excellent, good, fair, or poor the maximum score is 33 points. 2. Assessment of union:

The fracture was considered united clinically and radiologically on the following criteria:

Clinical union:

No pain, no tenderness and no mobility at the fracture site.

Radiologically:

- Re-establishment of bone continuity.
- Good callus formation.

Results

In this prospective study, we had treated twenty cases of distal tibial fractures by using anatomical anterolateral distal tibial plate. Clinical and radiological data collected in each follow up visit were analyzed. The time elapsed before operation ranged from 3 to 11 days with a mean of 7.15days. The longest time lag was due to medical problems that needed pre-operative treatment and cases presented with preoperative marked ankle edema.

Operating time from skin incision to closure ranged between 80 and 120 minutes with a mean of 98 minutes.

The minimal time was in cases with less comminution that had easy reduction. It increased gradually in cases with more comminuted fractures and difficult reduction.

The shortest follow up period was 6 months and the longest follow up period was 12 months with a mean of 9 months. The patients were followed up until they achieved complete fracture healing and almost normal ankle function.

According to Modified Functional Evaluation System by Karlstrom-Olerud (Refshauge KM 2006). The clinical results were graded as excellent in four patients (20%), good in thirteen patients (65%), fair in two patients (10%), & poor in one patient (5%). The excellent and good results were considered as satisfactory ones while the unsatisfactory included the fair and the poor results.

Thus, satisfactory results were found in 17 patients (85%), and the unsatisfactory ones were found in 3 patients (15%)

By the end of the follow up period Four patients (20%) had no pain at all, twelve patients (60%) had very mild pain that does not need medication, two patients (10%) had mild pain after activity that needs medication, two patients (10%) had moderate pain that present during restand needs medication

Eight patients regained full ankle range of motion with plantar flexion greater than 30

degrees and dorsiflexion greater than or equal to 15 degrees while eleven patients regained more than 50% of normal ankle range of motion with plantar flexion range from 10-30 degrees and dorsiflexion greater than or equal to 10 degrees and one patients regained less than 50% of normal ankle movement with plantar flexion less than 10 degrees, and dorsiflexion greater than or equal to 0 degree, less than 10 degrees Seventeen patients (85%) return to pre-fracture activity and three patients (15%) did not return to pre-fracture activity due to continuous pain or stiffness of the ankle .

There was a significant correlation between the age of the patient at the time of surgery and the final end result.

The highest incidence of satisfactory results was in the age group >30-50 (90-100% satisfactory results) while the highest incidence of unsatisfactory results was in the age >50-60 (25% unsatisfactory results). One case in the age group 20-30 had fair end result. One case in the age group>50-60 had poor end result

Type of fracture was found to have statistically significant effect in the results. The highest incidence of satisfactory results was in those with type A1 fractures (91.7% satisfactory results) while the highest incidence of unsatisfactory results was in those with type A2 and A3 fracture types (20-25%).

Time lag was found to have statistically significant effect in the results .The highest incidence of satisfactory results was in those who were operated upon during the second week (8-11 days after trauma) (100% satisfactory results). While the highest incidence of unsatisfactory results was in those who were operated upon during the first week (3-7 days after trauma) (33.3% unsatisfactory results)

Radiological evaluation of cases according to quality of reduction by **Teeny** and **Wiss** scoring (1993). There is no malalignment in all case

This is the time in which there is good callus formation at fracture site appeared in both anteroposterior and lateral views of X-ray and also after the patient had no tenderness at fracture site.

The time of union ranged from 13 to 30 weeks with a mean of 17.95 weeks and standard deviation was + 4.1.

Comparing the time of union and age, significant correlation was found (P-value <0.05). Significant correlation was found between the time of union and type of fracture (P-value <0.05)

The patients who had type A1 fractures showed rapid healing compared to those who had type A2 and A3 fractures types.

The mean time of union of patients with type A1 fracture was 16.17weeks while it was 20.8 weeks for patients with type A2 fracture and 19.75 for A3.

The mean time of union in those who had associated fibular fracture was 18.93 weeks while it was 14.8 in those without associated fibular fracture

Comparing the time of union and associated Fibular fracture, significant correlation was found (P-value<0.05)

Complications were encountered in 3 patients (15%) of this study.

In this study, two cases developed superficial wound infection. They were treated within first week after trauma and one case is diabetic. Culture and sensitivity was done and the appropriate antibiotic was given and the cases showed improvement. One case developed delayed union as the union started to appear after 20 weeks and completed after 30 weeks.



X-ray AP and Lat view after 5 months (complete union).

CASE	SIDE	AGE	SEX	M.O.T	TYPE	ASSOCIATED FIBULA	TIME BEFORE SURGERY	FUNCTIONAL RESULTS
1	LT	52	M	M.V.A	A1	Present	2	Excellent
2	RT	25	M	M.V.A	A2	Present	1	Good
3	LT	29	F	F.F.H	A1	Absent	5	Good
4	RT	53	M	Direct T.	A1	Absent	11	Good
5	LT	35	M	M.C.A	A1	Absent	3	Excellent
6	LT	53	F	M.C.A	A2	Present	1	Fair
7	RT	25	M	M.V.A	A1	Present	8	Good
8	LT	30	M	M.C.A	A1	Absent	2	Good
9	RT	27	F	M.V.A	A1	Absent	4	Good
10	RT	56	F	F.F.H	A1	Present	7	Good
11	RT	51	M	M.V.A	A3	Absent	1	Fair
12	RT	67	F	Direct T.	A3	Present	10	Excellent
13	LT	42	M	M.V.A	A3	Present	4	Excellent
14	LT	39	M	M.C.A	A1	Absent	10	Good
15	RT	58	M	Direct T.	A2	Absent	3	Good
16	LT	66	F	F.F.H	A1	Present	2	Poor
17	RT	28	M	M.C.A	A1	Absent	8	Good
18	LT	47	M	M.V.A	A1	Absent	2	Good
19	LT	49	M	Direct T.	A2	Absent.	8	Good
20	RT	48	M	M.V.A	A2	Absent	3	Good

Discussion

Fractures of the distal tibia involve the diaphyseal-metaphyseal area of the bone and they are one of the most challenging injuries in orthopedics and they account for less than 10% of all fractures of the lower extremity.⁽¹⁵⁾

Fractures of distal tibia which are accepted as unstable fractures have a wide range of treatment modalities from closed reduction to external fixation. The objectives in the treatment in these fractures are rapid and ideal healing, minimization of loss of function and prevention of any deformity.⁽¹⁶⁾

Any method of treatment must satisfy certain criteria. Firstly, the treatment should be simple and inexpensive and the material required for treatment available in every centre dealing with trauma. Lastly, the treatment should be effective.⁽¹⁷⁾

Plates manually shaped during the surgery in order to adapt them to the patient-specific anatomy, a delicate and time-consuming procedure that is prone to high inaccuracies.⁽¹⁸⁾

Current trends tend to offer fixation plates that are pre-contoured to the specific target location in which they are supposed to function.⁽¹⁹⁾

This study included 20 patients with closed distal tibial fractures treated in the period between March 2015 and March 2016 at Minia University Hospital with Anatomical antero-lateral distal tibial plate. through anterolateral approach of tibia.

The Anatomical anterolateral distal tibial plate used in this study was designed according to the anatomical features of the anterolateral surface of the distal tibia of healthy adults. The plates are precontoured to create a fit that requires little or no additional bending and helps with metaphyseal / diaphyseal reduction. The good fit of the plate and its bony surface was proven during surgery.

These cases were assessed according to Modified Functional Evaluation System by Karlstrom-Olerud (Refshauge KM 2006) In this system, the clinical outcomes including subjective and objective results are evaluated. Clinical results were graded as excellent, good, fair, or poor as follows:

Four patients (20%) had excellent results, thirteen patients (65%) had good results, two patients (10%) had fair results and one patient (5%) had poor results. The excellent and good results were considered as satisfactory and the unsatisfactory ones included the fair and the poor results and there were no malalignment in all cases.

To date, no published series have examined patients' functional outcome following distal tibial fractures fixation using the Anatomical anterolateral distal tibial plate.

In our study, the period of follow up ranged from 6 to 12 months with an average of 9 months. Age was found to have statistically significant effect in the end results of our study. The highest incidence of unsatisfactory results was in the age 50-60years old. This may be due to in younger patients, early union was achieved and significant correlation was found between age and time of union, also the better blood supply to the peripheral skin which helps to increase the healing power of the skin on the lower end of the tibia.

This is against Okeu et al.,⁽²⁰⁾ who reported that younger patients (<40 years) with pilon fractures had a mean score slightly lower than older patients (> 40 years). Most studies did not mention that the age had evident effect on the results.⁽²¹⁾

In our study, type of fracture was found to have statistically significant effect in the results. The highest incidence of satisfactory results was in those with type A1 fractures .The possible explanation being a low velocity injury with less soft tissue damage and less initial displacement. Also the patients who had type A1 fractures showed rapid healing than those who had type A2 and A3 fractures types.

Manninen et al., 2007⁽²²⁾ reported in his study two cases of malunion from 20 cases using lateral approach .One of these was 6° varus in 42 years old female with a grade I open, type A2 fracture. The other case was an 11° varus, 12° antecurvatum and 10 mm shortening in a 38 year old male with a closed A3 fracture and medial comminution.

Associated medical condition was found to have statistically significant effect in the results of our study. The highest incidence of unsatisfactory results was in the diabetic patients. Diabetic patients showed longer time to union than non diabetic patients and also one diabetic patient was complicated with superficial wound infection .

Smoking also was found to affect time of union as non smokers showed rapid healing than smokers. Tobacco use is recognized as another factor that is associated with delayed union of fractures. Patients should be advised regarding the bad effect of tobacco use.⁽²³⁾

In our study, time lag was found to have statistically significant effect in the results. The highest incidence of unsatisfactory results was in those who were operated upon during the first week (3-7 days after trauma).

This is in agree with the study done by Sirkin et al.,⁽²⁴⁾ who reported that the poor results in the series of Wyrshand co-workers⁽²⁵⁾ may have been due to surgical timing rather than the technique, because the internal fixation was performed at the worst possible time, namely 3 to 5 days post-injury, this time was not enough for improvement of the skin condition and subsidence of edema.

Also two cases developed superficial wound infection. They were operated within first week after trauma. This study included sixteen patients with associated fibular fracture and fixation was done in eight cases through the same incision from a single approach .

Comparing the functional end results and associated fibular fracture, no significant correlation was found . There was no fibular shortening in any case associated with fibular fracture. Fibular fixation was done in eight cases associated supramalleolar fracture fibula and she had excellent functional end either by plate and screws through single anterolateral approach to the tibia and fibula or by k- wires .

The need for fibular fixation is unclear in extra-articular fractures of the distal tibial metaphysis, especially if the concomitant fibular fracture occurs above the level of the distal tibio-fibular syndesmosis. Although some authors recommend stabilizing all concomitant ipsilateral fibular fractures, most agree that fixation should be performed if the fracture involves the distal tibiofibular syndesmosis or ankle^{(26), (27)}. This practice reflects results from studies demonstrating that the stability of the syndesmosis has a direct correlation with good clinical outcomes in ankle fractures.⁽²⁸⁾

Other authors have reported that adjunctive fibular fixation aids to reduce distal tibial fractures^{(29),(30)}. In general, adjunctive fibular fixation seems to lessen the risk of distal tibial malalignment, but only a few clinical reports have specifically evaluated this clinical impression. In a retrospective study, Egol et

al.,⁽³¹⁾ evaluated the role of fibular fixation in maintaining alignment of distal tibial fractures stabilized with a statically locked intramedullary nail. Of the 72 cases, there was loss of tibial alignment in 1 of 25 (4%) patients who had the fibula stabilized as compared to 6 of 47 (13%) who did not. Late loss of distal tibial alignment was statistically associated with the lack of adjunctive fibular fixation. While a report by Whittle et al.,⁽³²⁾ showed that the absence of fibular fixation did not increase the incidence of malunion in distal tibial fractures stabilized with intramedullary nailing. In their series, fibular stabilization was performed in 1 of 25 distal fourth tibial fractures.

In Whorton and Henley's⁽³³⁾ retrospective review of 157 open tibial fractures with ipsilateral fibular injuries, there were no statistical differences in final fracture alignment, time to union or number of secondary procedures needed to achieve union between the groups defined by fibula stabilization (all distal fibular fractures that involved the syndesmosis and ankle mortise were stabilized). They concluded that fibular fixation in the absence of syndesmotic and mortise-related injuries did not affect outcomes of open tibial fractures.

Also cases without associated fibular fractures in our study showed rapid healing than cases associated with fibular fractures. The possible explanation is that intact fibula keeps length rotation, alignment, minimizes soft tissue dissection and less soft tissue damage.

This is against Teitz et al.,⁽³⁴⁾ who examined the effects of an intact fibula associated with a tibial fracture. They found that distal tibial fractures in patients aged 20 years or older with an intact fibula had a 61% complication rate including 22% delayed union, 4% nonunion and 26% varus malunion. Other reports of delayed tibial fracture healing with an intact or healed fibula have suggested that an intact fibula may prevent cyclic compression of the fractured tibia necessary for physiologic bone healing.

In this study four patients with associated fibular fractures were fixed through single anterolateral approach to the tibia and fibula with no need to another approach and thus minimizing soft tissue trauma during surgery

.and the end results were satisfactory to all patients.

Shantharam and co-workers (2000)⁽³⁵⁾, described Single anterolateral approach for combined distal tibia and fibular faractures By using a single incision from the anterolateral side, the fibular fracture can be fixed and the lateral aspect of the distal tibia can be safely approached for internal fixation thus eliminating the need for two separate incisions which may be associated with extensive soft tissue dissection and poor postoperative results, including soft tissue devitalization, skin sloughing, infection, and delayed union or non-union

In this study, three patients had complications. Two cases developed superficial wound infection, one case developed delayed union. No cases of symptomatic hardware were found.

Comparing to the study by TW Lau et al.,; 2008.symptomatic hardware was a common problem in the medial plating group (42.9%), but was unusual in the lateral plating group (5.1%). Seven superficial infections (8%) were noted in their study, 5 in the medial plating group and 2 in the lateral plating group. (118)

Also compared to the study done by Manninen2007 et al., ⁽²³⁾superficial wound infections were noticed in four patients. All four were extra articular fractures, and one of them was open grade I fracture, all four patients got antibiotics during and after the operation, the patients were aged between 26 and51 years old. No deep infections happened and the plate was removed using the same lateral approach 16/20 times mostly due to metal work irritation.

This may be due to poor skin circulation and insufficient blood supply to the fracture site could produce wound necrosis and nonunion. Also medial plates located directly under the skin and the subcutaneous soft tissues on the medial side of the distal tibia are thin. Also the inaccurate contouring of the plates used by Manninen2007.

One of the most important reasons for delayed union and nonunion is inadequate fixation of fracture. The most important reason of delayed union and nonunion in plate fixation is

deterioration of the already damaged distal tibial circulation even with the use of bone grafting.⁽¹⁹⁾

The time of union in our study ranged from 13 to 30 weeks with a mean of 17.95 weeks. Comparable to the study done by Oog-jinShon and Chul-hyun Park 2012⁽³⁵⁾ about minimally invasive plate osteosynthesis of distal tibial fractures; there were twelve patients fixed by medial MIPO (group M) and the other twelve patients by lateral MIPO (group L). Fixation of lateral group was done using periarticular lateral distal tibial plate.

For the lateral group the mean age was 55.2 (31-74) and the interval between the trauma and the operation was 3.6 (1-8). The fracture type was A1 in three cases A2 in three cases A3 in six cases and six patients had associated fibular fracture. The mean dorsiflexion range was16.30 and the mean planter flexion was 38.30

The mean time to union was 16.9 (13–20) weeks in lateral group. No patient had angular deformity and no patient had a tibialshortening . Comparable to the study done by Yih-Shiunn et al.,⁽³⁶⁾about; eighty eight patients with distal tibial fractures were divided into 2 groups: the medial plating group included 49 patients and the lateral plating group included 39 patients.

The lateral plating group used a lateral approach with an average age of 36.8 years. There were 6 open fractures including 3 cases type I and 3 cases type II. Thirty-five tibial fractures (89.7%) were concurrent with ipsilateral fibula fracture. The mean follow-up was 34.3 months.

The plates used were dynamic compression plates, T-plates, or locking compression plates. The chosen plate was bent to the shape of the tibia so that the distal end of the plate could nearly reach the joint line.

In the lateral plating group, the mean healing time was 16.1weeks, and healing occurred in all but 1 case (97.4%) in 6 months. Evaluation of postoperative radiographs for adequacy of reduction in the lateral group revealed excellent results in 29 (74.4%) cases, good reduction was achieved in 8 (20.5%) cases and Poor reduction occurred in 2 (5.1%) cases in the lateral plating group.

The final range of motion averaged 19° ankle dorsiflexion (range, 10°-35°) and 35.3° ankle plantar flexion (range, 25°-45°). In the lateral plating group, there were 2 malunions (5.1%), including one case with posterior angulation and one case with valgus deformity.

In the lateral plating group, there were 3 complications (7.7%), including 2 superficial infections (5.1%) and 1 nonunion (2.6%) and only 2 of 39 patients (5.1%) reported symptomatic hardware problems. Eight of 39 patients (20.5%) asked to have the hardware removed.

Comparable to the study about lateral approach for fixation of the fractures of the distal tibia done by Manninen et al., 2007. there were 20 patients with distal tibial fractures. The plates used were DCP in 18, LC-DCP in one, and reconstruction plate in one of the cases. The chosen plate was bent exactly to the shape of the tibia. The distal end of the plate could nearly reach the joint line.⁽²⁴⁾

The median age of the patients was 38(15–66) years at the time of the operation. Eleven of the patients were men and nine women. According to the AO-classification 18/20 fractures were extra-articular (seven A1, six A2, five A3) and two intra-articular type C1. There were three cases Gustilo grade I, and one case grade IIIA. fracture.

In 12 cases the operation was performed within 48 hrs from the fracture. The median operation time was 90 (45–135) min. The accompanied fibular fracture was fixed in 12/20 of the cases. At the time of follow-up in clinical examination no limping was noticed in 15/20 patients and mild limping in five. No rotational malunion was noticed in any of the patients. The length of the tibia was unaltered in 18/20, while it was shortened by 5 mm in one and by 10 mm in one of the cases. Mean time to union was 20 weeks.

Dorsiflexion of the ankle of the operated leg was normal in 17/20 and plantar flexion of the ankle was unaltered in 16/20 of the patients. Superficial wound infections were noticed in four patients.

At the time of follow-up there were no nonunion. Radiologically the tibia malunited in two cases.

Subjectively the result was excellent or good for 17 patients, moderate for one and poor for two.

While in our study 20 patients with closed extra-articular distal tibial fractures treated with Anatomical anterolateral distal tibial plate. There were fourteen males and six females' with a mean age of 36.6 years. The fracture type was A1 in 12 cases, A2 in 5 cases and A3 in 3 cases. There were 16 cases with associated fibular fractures and fixation was done in eight cases. The mean time of union was 17.95 weeks. Seven patients regained full ankle range of motion. There were no cases of malunion, nonunion or metal work

Conclusions

The Anatomical anterolateral distal tibial plate is effective in stabilizing distal tibia fractures with the advantage of early weight bearing, good soft tissue cover for the plate on the anterolateral surface of the tibia and less soft tissue complications and metalwork irritation symptoms and the ability to fix associated fibular fractures through the same approach .

Waiting until soft tissue condition improves, younger age and less complexity of fracture, lead to better end results. Although the overall complication rate for open reduction and internal fixation for the distal tibial fractures is high, there were no serious complications. The most common complication was superficial wound infection. We conclude that anatomical anterolateral distal tibial plate used for fixation of distal tibial fractures is a demanding, especially in cases where no medial comminution of the tibia.

Furthermore, other studies are needed to assess patient's functional outcomes and to compare the overall complication rates using this plate.

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