

Surgical Outcome of Anterolateral Plate Fixation In Distal End of Tibia Fracture



Orthopaedic

KEYWORDS: Distal End of Tibia Fracture , Anterolateral Locking Plate .

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ABSTRACT

Introduction-Soft tissue healing is important 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. The aim of this study was to evaluate the functional outcome and complications of anterolateral locking plate in distal tibial fractures.

Duration Of Study- 2 years

Objectives-To Evaluate function outcome after using Anterolateral Locking Plate in Distal End of Tibia Fracture
To assess the complication after using Anterolateral Locking Plate.
To find out the time required for fracture healing after use of Anterolateral locking plate

Results: The fractures united in 19 patients while nonunion was seen in 1 patient. Postoperatively, 2 patients developed superficial skin infection, 1 patients developed deep infection and 1 patient developed ankle stiffness due to loss of postoperative protocol. Good amount of range of mobility of ankle joint was present in almost all patients.

Conclusions-In surgical treatment of fractures of distal tibia, anterolateral approach allows proper exposition of lateral malleolus and distal tibia, especially its epiphysis. With this approach precontoured, anterolateral plate should be used for fixation of tibia fracture. Properly placed plate in this region is well covered with soft tissue, thus minimizing risk of problems with surgical wound healing.

INTRODUCTION:

Distal tibial fractures are difficult to treat and often result in permanent disability. These fractures are relatively rare, accounting for only 3% to 10% of all fractures of the tibia and less than 1% of all fractures of the lower extremity.^{1,2} After diaphyseal fractures, the highest incidence of open fractures of the tibia and fibula occur in the tibial plafond.³

The management of distal tibia fractures has always held a particular interest for orthopaedic surgeons. Not only are these fractures relatively common, but they are often difficult to treat. The subcutaneous location of the anteromedial surface of the tibia means that severe bone and soft tissue injury is not infrequent, and there is a high incidence of open fractures compared with other long bones.⁴

Until relatively recently, surgeons had to rely on nonoperative management, and the incidences of nonunion, malunion, and joint stiffness were high. Tibial diaphyseal fractures commonly affect young males, and a severe fracture complicated by nonunion or infection often results in employment loss or other social and economic problems. These complications also place a considerable strain on the health services of all countries. Surgical stabilization of fractures and early mobilization of the patient provides best clinical outcome. The 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. Distal Tibia 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.⁴

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 addition, the factors that lead to good versus poor outcomes often depend on treatment techniques than other factors, which can be controlled. For these reasons, new treatment techniques may need to continue to be evaluated in case series and cohort studies.⁴

Internal fixation was considered gold standard in 1980s by Ruedi of the AO group. The enthusiasm was soon lost due to the wound breakdown, osteomyelitis and sepsis associated with open reduction and plating technique.⁵ External fixation emerged as a successful technique for decreasing significant septic complications that had been previously attributable to open surgical management.⁶

Medial plating with anteromedial surface of distal tibia still resulted in a significant rate of wound dehiscence and deep infection, although at a lower rate compared to AO plates. Locking compression plates designed to contour the lateral surface of distal tibia were developed recently. These plates were fixed using the anterolateral approach to the distal tibia. Plating using Locking Compression Plate on the subcutaneous medial surface of distal tibia still resulted in a significant rate of wound dehiscence and deep infection, although at a lower rate compared to AO plates.⁷

Hence, the study was conducted with an objective to evaluate the efficacy of anterolateral locking plate on distal end of tibia.

AIM AND OBJECTIVES:

AIM:

- To evaluate the efficacy of a distal end of tibia anterolateral locking plate and to specifically study the effect of a patient age.

OBJECTIVES:

- To evaluate functional outcome after using anterolateral locking plate in distal end of tibia fracture.
- To assess the complications after using locking plate.
- To find out the time required for fracture healing after use of locking plate.
- To achieve union of fracture bones.
- To achieve early mobilization of adjacent joints and prevent

fracture disease.

MATERIALS AND METHODS:

Study Design:

The present study was prospective interventional study undertaken to evaluate the efficacy of a distal end of tibia by anterolateral locking plate.

Study Period:

The present study period was carried out during July 2014 to June 2016 at department of Orthopaedics of the hospital.

Study Population:

All the patients presenting to the OPD and Emergency department with history of trauma to distal tibia and diagnosed as having fracture of distal tibia were included as study population.

Sample Size:

A total sample size of 20 patients selected by simple random sampling with distal end tibia fracture treated by anterolateral locking plate were included in the study.

Inclusion Criteria:

1. Adults, both males and females
2. Only closed and grade 1 open fracture included
3. Patients above the age of 18 years
4. Patients fit for surgery

Exclusion Criteria:

1. All fractures with neurovascular injury.
2. Patient not willing for surgery
3. All old fractures.
4. All open fracture except Grade 1.

RESULTS:

Distribution of patients according to tibia bony union:

Tibia Union	No. of Patients	Percentage
3 weeks	00	00.00
6 weeks	00	00.00
12 weeks	12	60.00
6 months	07	35.00
12 months	01	05.00
Total	20	100
Mean time of Union (weeks)	17.60	11.19

The above table showed distribution of patients according to rate of union. It was observed that mean time for union was 17.60 ± 11.19 weeks. The majority of fracture tibia united at 12 weeks (60%) followed by 6 months (35%).

Distribution of patients according to complications:*

Complications	No. of Patients (N=20)	Percentage
Non union	01	05.00
Malunion	01	05.00
Infection	03	15.00
Secondary Procedure	01	05.00
Deformity	00	00.00

(*Multiple response Present)

The above table showed distribution of complications. It was observed that among 20 patients, 3 (15%) had infection, while non union was observed in 5% patients. The secondary procedure was done in one (5%) patient while malunion was present in 5% patients.

Distribution of patients according to Functional outcome:

Functional outcome	No. of Patients	Percentage
Excellent	11	55.00
Good	05	25.00

Acceptable	03	15.00
Poor	01	05.00
Total	20	100

The above table showed distribution of patients according to functional outcome. It was observed that functional outcome was 55%, 25%, 15% and 5% excellent, good, fair and poor respectively.

Relation of age and Functional outcome:

Functional outcome	<40 years (%)	>40 years (%)	Total (%)
Excellent	11 (68.75)	00 (00)	11 (55.00)
Good	04 (25.00)	01 (25.00)	05 (25.00)
Acceptable	01 (06.25)	02 (50.00)	03 (15.00)
Poor	00 (00)	01 (25.00)	01 (5.00)
Total	16 (100)	04 (100)	20 (100)

($X^2=5.64$ Yates Corrected; $DF=1$; $P=0.02$ Statistically Significant)

The above table showed relation of age and functional outcome. It was observed that age and functional outcome showed statistically significant relation. ($P<0.05$)

CASE



Pre-operative

Post-operative



3 weeks

3 months



6 months

1 year



Dorsiflexion

Plantar flexion



Inversion

Eversion

DISCUSSION:

The present study was prospective study undertaken to evaluate surgical outcome of anterolateral plate fixation in distal end of tibia fractures.

The study was conducted during the period of July 2013 to June 2016. All the patients presenting to the OPD and Emergency department with history of distal end of tibia fracture were included as study population.

A total sample size of 20 patients above 18 years of age with distal end of tibia fracture selected randomly was included in study.

The patients with distal end of tibia fracture with only closed and grade 1 open fracture were included in the study. The patients with neurovascular injury, old fractures and all open fractures except grade 1 were excluded from the study.

The data collection was done by using predesigned pretested questionnaire. The questionnaire consisted of two parts. The first part included socio-demographic details and complete medical and surgical history. The second part consisted of the functional outcome after follow up of one year.

In the present study distribution of patients according to age showed that majority of patients were from age group 21-40 (60%). The mean age among the patients was 32.90 ± 12.56 years.

Similar findings were seen in study done by Devendra Lakhotia et al⁸ to evaluate the complications of minimally invasive anterolateral locking plate in distal tibial fractures observed that among 42 patients the mean age was 42.8 years (range, 25 to 75 years).

In the study done by Karthik G et al⁹ on comparison of functional outcome of medial versus anterolateral plating of distal tibia fractures observed that among 12 patients with anterolateral plating had mean age of 43.16 years.

Similar findings were seen in study done by Krzysztof Piątkowski et al¹⁰ to compare different locking plate fixation methods in distal tibia fractures observed mean age of 48 years in anterolateral approach of distal tibia fracture.

It was observed that among 20 patients, 13 (65%) had comminuted fracture, 4 (20%) had transverse fracture and 3 (15%) had segmental tibia fracture.

In the present study the distribution of patients according to rate of union showed that mean time for union was 17.60 ± 11.19 weeks. The majority of fracture tibia united at 12 weeks (60%) followed by 6 months (35%).

Similar findings were seen in study done by Krzysztof Piątkowski et al¹⁰ where the fracture union time was 22 weeks in anterolateral approach of distal tibia fracture treatment.

In the present study it was observed that among 20 patients, 3 (15%) had infection, while non union was observed in 5% patients. The secondary procedure was done in one (5%) patient while malunion was present in 5% patients.

Similar findings were seen in study done by Karthik G et al⁹ where among 12 patients in the anterolateral group 25% had complications. The delayed wound healing, infection and malunion was observed in 8.73% respectively.

The findings were in accordance with study done by Krzysztof Piątkowski et al¹⁰ where infection was observed in 12.9% patients and delayed union in 18.6% patients.

The onset of complications appeared to depend more on the

injury itself that on the type of approach employed to manage the fractures. The soft tissue involvement with its site and depth, fracture configuration and intra articular involvement are the most important parameters in deciding the appropriate approach and implant.

In the study, distribution of patients according to functional outcome showed that functional outcome was 55%, 25%, 15% and 5% excellent, good, fair and poor respectively. It was observed that age and functional outcome showed statistically significant relation. (P<0.05)

Similar findings were seen in study done by C.A. Encinas-Ullan et al¹¹ where at the end of the follow-up period there were 33 (82%) excellent and good results in patients with distal tibia fractures operated with anterolateral approach.

In surgical treatment of fractures of distal tibia, proper choosing of approach plays a very important role. A well planned and executed approach enables the surgeon to perform good fracture reposition as well as determines which type of fixation plate might be used. The most popular is the antero-lateral approach. It allows proper exposition of lateral malleolus and distal tibia, especially its epiphysis. With this approach precontoured, antero-lateral plate should be used for fixation of tibia fracture. Properly placed plate in this region is well covered with soft tissue, thus minimizing risk of problems with surgical wound healing. A possible complication in this approach is iatrogenic rupture of superficial peroneal nerve that is localized in this area.

The limitations of this study included the small number of patients. The strengths of this work include it being a prospective study, not losing any patients during follow-up and a monitoring period of over 2 years.

CONCLUSION:

The present study was prospective study undertaken to evaluate surgical outcome of anterolateral plate fixation in distal end of tibia fractures.

In surgical treatment of fractures of distal tibia, anterolateral approach allows proper exposition of lateral malleolus and distal tibia, especially its epiphysis. With this approach precontoured, anterolateral plate should be used for fixation of tibia fracture. Properly placed plate in this region is well covered with soft tissue, thus minimizing risk of problems with surgical wound healing.

REFERENCES

- Rüedi T.P., Allgöwer M. Fractures of the lower end of the tibia into the ankle-joint. *Injury* 1969;1:92-99.
- Rüedi T.P., Allgöwer M. The operative treatment of intra-articular fractures of the lower end of the tibia. *Clin Orthop* 1979 Jan-Feb; (138):105-10.
- Court-Brown CM, Walker C, Garg A, McQueen MM. Half-ring external fixation in the management of tibial plafond fractures. *J Orthop Trauma* 1999 Mar-Apr;13(3):200-6.
- Dr. Lokesh Holagundi, Dr. Deepak S, Dr. Dayanad, Dr. Ramachandra. Functional Outcome with Surgical Management in Distal Tibia Fracture. *IOSR Journal of Dental and Medical Sciences*. 2014;13(5):83-90.
- Ruedi, Murphy WM et al. Book of AO principles of fracture management. AO publication, 2005.
- Gorczyca JT, McKale J, Pugh K, Pienkowski D et al. The modified tibial nail for treating distal tibia fracture. *J orthop and trauma*. 2002;16(1):18-22.
- Gupta RK, Rohilla RK, Sangwan K, Singh V, Walia S et al. Locking plate fixation in distal metaphyseal tibia fracture. *J Int orthop*. 2010 Dec;34(8):1285-90.
- Devendra Lakhotia, Gaurav Sharma, Kavin Khatri, G.N. Kiran Kumar, Vijay Sharma, Kamran Farooque. Minimally invasive osteosynthesis of distal tibial fractures using anterolateral locking plate: Evaluation of results and complications. *Chinese Journal of Traumatology*. 2016; 19:39e44.
- Karthik G, Senthilnathan A, Balamurugavel P.S., Prabhakar R, Viswanathan M. A Study of Comparison of Functional Outcome of Medial Versus Anterolateral Plating of Distal Tibia Fractures. *International Journal of Current Medical Sciences*. 2015; Vol. 5, Issue 10: 75-77.
- Krzysztof Piątkowski & Piotr Piekarczyk & Krzysztof Kwiatkowski & Mateusz Przybyciec & Bartłomiej Chwedeć. Comparison of different locking plate fixation methods in distal tibia fractures. *International Orthopaedics (SICOT)*. 2015; 39:2245-2251.
- C.A. Encinas-Ullán, R. Fernandez-Fernandez, J.C. Rubio-Suárez, E. Gil-Garay. Medial versus lateral plating in distal tibial fractures: A prospective study of 40 fractures. *Rev Esp Cir Ortop Traumatol*. 2013;57(2):117-122.