



A Prospective Study of Management of Lower end Tibia Fractures with Locking Compression Plate

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ABSTRACT

Our objective is to evaluate clinical results and outcomes of reduction technique and minimally invasive percutaneous plate osteosynthesis (MIPPO) technique. Adult patients with fractures of lower third tibia admitted to Ramkrishna Care Hospital, Raipur, Chattisgarh was taken for this study after obtaining their informed, valid written consent. This is a prospective study from September 2014 to September 2015. Twenty seven patients were followed an average of 6 months (range 6 – 12 months) with mean fracture healing time was 14 weeks (12-20 weeks). One patient had delayed union which took 20 weeks. Three patients developed ankle stiffness and one patients developed osteomyelitis but fractures united completely. This technique has resulted in effective stabilization of lower third tibial fractures. It does provide adequate stability and allows early mobilization. Open reduction not only helps in achieving reduction in difficult situation but also in rapid union because it facilitates preservation of blood supply to the fragment and anatomical reduction of fracture with greatest advantage being fracture hematoma is not disturbed. This technique is effective in extra articular fractures occurring within 5cm of joint where intramedullary nails often don't provide adequate stability.

KEYWORDS : Distal third tibial metaphysis, Locking compression plate, Minimally invasive percutaneous plate osteosynthesis (MIPPO)

INTRODUCTION

The difficulty in treating the fractures of distal tibial end is exemplified by orthopaedists, who in the first half of twentieth century, believed these injuries were so severe and fraught with so many complications, that the fracture was deemed not amenable for surgical reconstruction. Distal tibial fractures represent a significant challenge to most of the surgeons even today. They are only 1-10% of all lower extremity fractures. Conservative treatment by cast application lead to prolonged immobilization, leading to ankle and knee stiffness affecting quality of life of the patient. Introduction of the locking compression plate was a revolution in the evolution of management of fractures where prolonged bed rest is avoided and return to work is satisfactorily helpful. Compared with a conventional plate, a locking plate imparts a higher degree of stability and provides better protection against primary and secondary losses of reduction and minimization of bone contact. Locking plates (LPs) have the biomechanical properties of internal and external fixators, with superior holding power because of fixed angular stability through the head of locking screws, independent of friction fit.

MATERIALS AND METHODS

All cases studied were patients from male and female general and private wards with their informed consent and approval from ethical committee. **Study population:** Adults admitted an operated with distal end tibia fracture at Ramkrishna Care Hospital, Raipur Chhattisgarh. After obtaining valid written informed concern. **Study design:** Prospective clinical evaluation study. **Sample Size:** As per old hospital record total no. of cases with lower end tibia fractures was not very high so all the patients coming to Ramkrishna Care Hospital during the period (September 2014 to September 2015) were taken into consideration. (TOTAL:30). Quantitative data analyzed using mean SD and t test. **Inclusion criteria :** Adults (aged more than 18 years) males and females coming to Ramkrishna Care Hospital with fracture of lower end of tibia. Simple fractures unfavourable for interlocking nailing. Complex fractures of the lower third of tibia. **Exclusion criteria :** Patients aged below 18 years. Patients not involving with epiphyseal injuries. Patients not willing to undergo surgery. Patients medically unfit for surgery. **Methodology:** On admission of the patient, a careful history was elicited from the patient and/or attenders to reveal the mechanism of injury and the severity of the trauma. The patients were then assessed clinically to evaluate their

general condition and the local injury. General condition was assessed with the vital signs and systemic examination. Methodical examination was done to rule out fractures at other sites. **SURGICAL TECHNIQUE: Plate selection :** The plates are available in various lengths and configurations similar to the Synthes Plate. Fragment Set. If necessary, use a bending template to determine plate length and configuration. **Contouring:** Use the bending instruments to contour the Locking Compression Plate to the anatomy. **Screw placement verification:** Since the direction of a locking screw is determined by plate design, final screw position may be verified with a K-wire prior to insertion. This becomes especially important when the plate has been contoured or applied in metaphyseal regions around joint surfaces. 1. With the 2.8 mm Threaded Drill Guide in place, insert the 1.6 mm Wire Sleeve into the threaded drill guide. 2. Insert a threaded 1.6 mm Kirschner Wire through the wire sleeve and drill to the desired depth. Verify K-wire placement under image intensification to determine if final screw placement is acceptable. Measurement may be taken by sliding the tapered end of the Direct Measuring Device over the K-wire down to the wire sleeve. Remove the Direct Measuring Device, K-wire and 1.6 mm wire sleeve, leaving the threaded drill guide intact. Use the 2.8 mm Drill Bit to drill the near cortex. Remove the threaded drill guide. Insert the appropriate length locking screw. **Follow up-** The patients were followed up at second, fourth, eighth, twelfth weeks and then every 2 months for up to 6-10 months to assess the radiological union. After the 1st follow up of 2 weeks, sutures were removed and POP slab was continued for another 6 weeks. At 4 weeks Check X-Rays were taken to see for signs of union. POP Slab was retained till third follow up at 8th week. The fracture was designated as united, when there was periosteal bridging callus present at the fracture site at least in three cortices in the anteroposterior and lateral views. Trabeculations extending across the fracture site was also taken into consideration. Partial and full weight bearing were allowed based on the radiological union and consolidation of the fractures.

DISCUSSION

According to the study, 27 patients with fractures of the distal tibial had undergone open reduction and closed reduction through MIPPO techniques of application of the locking compression plates. This technique has resulted in the effective stabilization of these fractures. It does provide adequate stability and allows early motion. The open reduction not only helps in achieving reduction in difficult situations,

but also in rapid union, because it facilitates preservation of the blood supply to the fragment and anatomical reduction of the fracture. Its greatest advantage in open reduction and internal fixation with locking compression plates is anatomical reduction is achieved and fracture hematoma is not disturbed much. It is also effective in extra articular fractures occurring within 5cm of the joint because, Intramedullary nails often do not provide enough stability and external fixators usually applied for primary stabilization and until soft tissue edema get subsided and delays the return to work with fixators. It is a simple, has a rapid and straight forward application and has a reduced surgical time in more extra articular fractures and intra articular fractures due to newer anatomically contoured locking compression plates for the distal end tibia fractures. Although, a larger sample of patients and longer follow up are required to fully evaluate this method of treatment, we strongly encourage its consideration in the treatment of such complex fractures.

RESULTS

All patients were evaluated clinically and radiologically before and following surgery, for an average period of follow up was 6 months. The age of the patient in this study, ranged from 19 years to 85 year average being 46.44 years. There were 20 male patients as compared to 7 female patients in this study. 15 patients had fracture of left lower one third of tibia fractures and 12 patients had fracture of right tibia. 22 fractures were closed and 5 were open fractures. 16 cases sustained fracture following road traffic accident (high energy trauma), 11 cases sustained fall (low energy trauma). There were 23 cases of associated fibular fractures and two had head injury. The fractures united in 27(100%) patients with 1(3.7%) case of delayed union, which took 20 weeks of time period for the radiological signs of callus formation. The fracture was additionally supported by an above knee plaster of paris slab postoperatively for 12-14 days and later converted to below knee slab and patient was made walk without bearing weight over operated limb. Post operatively patients after 4 weeks, slab was removed and made them walk with walker/crutches with partial weight bearing. Post-operatively, 3(42.86) patients developed superficial skin infection and 2 patients developed ankle stiffness (42.86%) one patient slipped and fell down while walking with crutches and developed angular deformity (varus at fracture site) another due to loss of post operative physiotherapy protocol and one developed osteomyelitis of lower third of tibia, he had sustained compound fracture of lower third tibia-fibula which was initially fixed with external fixator and later on with LCP. He developed superficial infection first and later osteomyelitis because of non compliance with dressing precautions and schedule. Good amount range of mobility of ankle joint was present in almost all patients. By the analysis of the data collected in the present study, open reduction and internal fixation with locking compression plate for lower one third fractures of tibia is the choice of treatment for adult

CONCLUSION

This technique has resulted in effective stabilization of lower third tibial fractures. It does provide adequate stability and allows early mobilization. Open reduction not only helps in achieving reduction in difficult situation but also in rapid union because it facilitates preservation of blood supply to the fragment and anatomical reduction of fracture with greatest advantage being fracture hematoma is not disturbed. This technique is effective in extra articular fractures occurring within 5cm of joint where intramedullary nails often don't provide adequate stability.

REFERENCES

1. Martin JS, Marsh JL, Bonar SK, De Coster TA, Found EM. Assessment of the AO/ASIF fracture classification for the distal tibia. *J Orthop Trauma* 1997; 11: 477-483.
2. Michael Sirkin, Roy Sanders. The treatment of pilon fractures. *Clinic Orthop* 2001;32(1): 91-102.
3. John Charnley. The closed treatment of common fractures. Cambridge. Colt Books Ltd., 1999.
4. Collinge C, Sanders R. Minimally-invasive plating. *J Amer Acad Orthop Surg*. 2000;8:211-217
5. Collinge C, Sanders R, DiPasquale T. Treatment of complex tibial periarticular fractures using percutaneous techniques. *Clin Orthop Relat Res*. 2000;375:69-77
6. Helfet DL, Shonnard PY, Levine D, et al. Minimally Invasive plate osteosynthesis of distal fractures of the tibia. *Injury*. 1999;28:5-A42-S-A48.
7. Hasenboehler E, Rikli D, Babst R. Locking compression plate with minimally invasive plate osteosynthesis in diaphyseal and distal tibial fracture: a retrospective study of 32 patients. *Injury*. 2007;38:365-370.

8. Namazi H, Mozaffarian K. Awful considerations with LCP instrumentation: a new pit-fall. *Arch Orthop Trauma Surg*. 2007;127: 573-575
9. Egol KA, Kubiak EN, Fulkerson E, Kummer FJ, Koval KJ. Biomechanics of locked plates and screws. *J Orthop Trauma*. 2004;18:488-493.
10. Kaab MJ, Frenk A, Schmeling A, Schaser K, Schutz M, Haas NP. Locked internal fixator: sensitivity of screw/plate stability to the correct insertion angle of the screw. *J Orthop Trauma*. 2004; 18:483-487.