Original Article

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Supracutaneous Locking Compression Plate for Grade II Compound Fracture Tibia: A Case Series

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Abstract

Background: Supracutaneous plating using a locking compression plate (LCP) as an external fixator in compound fractures. The purpose of this report is to describe our successful results using the LCP as an external fixator in the treatment of Grade II compound fractures of the tibia.

Materials and Methods: A total of four patients underwent "supracutaneous plating" of the tibia using an LCP. Average age was 55 years. Regular screw tract dressings were done. Average period of follow-up was 12 months.

Results: The plate was *in situ* for an average of 24-30 weeks. There were no clinically significant screw site infections. In all four patients, the plate was kept in place until there was complete consolidation both clinically and radiologically. At the latest follow-up (average 12 months), all patients were fully weight bearing with a fully healed tibia. All patients were infection-free with well-healed wounds.

Conclusion: Routinely, after initial debridement and temporary bony stabilization is provided by external fixation in compound fractures of the tibia with significant soft tissue injury. Most external frames for the lower leg are bulky and cumbersome, causing significant problems for the patient. To circumvent these issues, we have successfully used supracutaneous LCP as external fixator in a series of five patients for Grade II compound fracture of the tibia.

Key words: Compound tibial fractures, External fixation of locking compression plate, Locking compression plate

INTRODUCTION

In compound Grade II fractures, debridement followed by fracture fixation is the usually followed two stage treatment protocol in the management. The stability of the fracture after debridement will prevent infection and promote wound healing. So, temporary fracture stabilization by external fixation is advocated. Most of the fixator frames used in tibia fracture fixation are bulky and cumbersome to the patient, causing inconvenience to them. It may also cause a disturbance in gait. Locking compression plate (LCP) as an external fixation device is described in the management of open fractures, non-union, septic arthritis, and even as an adjunct in distraction osteogenesis. We report in this study, the outcome of LCP as an external fixator device among four adult patients for compound Grade II fractures of the tibia.[1-7]

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MATERIALS AND METHODS

During 2014-2015, a total of five patients underwent external plating ("subcutaneous plating") of the tibia using a metaphyseal locking plate. Four patients with Grade II compound fractures of the tibia included in the study. The average age of the patients was 52 years (range 45-60).The average time of presentation was 36 h (range 10 h - 3 days). In Table 1, the patient data are summarized. Subcutaneous locking compression plate for Grade II compound fracture tibia

Follow-up done in 6, 10, 12, 20 weeks and 1 year clinically and radiologically.

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Table 1: Details of patients

Patient	Age/sex	Diagnosis	Duration of LCP	Outcome	Follow-up
Velappan	55/m	Compound Grade II tibia	22 weeks	Good	12 months
Muthiah	60/m	Compound Grade II tibia	18 weeks	Good	12 months
Sasikumar	48/m	Compound Grade II tibia	18 weeks	Fair	16 months
Anantham	50/f	Compound Grade II tibia	20 weeks	Good	12 months

LCP: Locking compression plate

Figure 1: (a) Patient 1, (b) Patient 2

Surgical Technique

Under spinal anesthesia, the patient was prepared and draped. Wound wash was given. Wound closed with stay sutures. Then, the fracture is reduced and stabilized with tibial LCP. The plate was initially fixed proximal and distal K-wires. Then, the reduction was achieved. On either side of fracture minimum, three to four locking bolts were applied. The plate was fixed close to fracture but leaving some space between skin and plate for wound care and edema. Screw tract and wound dressing were done. Patients were discharged on the sixth post-operative day. Regular follow-up was done.

One patient needed bone grafting at 10th week due to non-progressive changes in union and distraction in fracture site. Knee and ankle movements started on the second post-operative day. Regular screw tract and wound dressing done. Partial weight bearing started around 6 weeks.[7-15]

RESULTS

The plate was *in situ* for average 20 weeks. In all patients, plate was removed after radiological and clinical union. No screw tract infection found in our cases. In one patient, two screws loosening was reported at 15 weeks. In one patient needed bone graft at 10th week and average follow-up 15 months. All patients were having union of the tibia.

DISCUSSION

The prevalence of tibia non-unions increases with the severity of open fractures.[5-9] The endosteal and periosteal blood supply is often extensively destroyed when the open fracture occurs in the of the tibia, which is regarded as the most important to the healing of a tibia fracture Using LCP as an external device not only stabilizes the fracture but also preserves the vascularity of the tibia and promotes union.[1-4] Non-union due to infection in compound fractures of the tibia is a commonly encountered scenario which can be avoided by external stabilization devices. However, LCP as an external device is superior and advantageous than other standard and circular external frames. Locking plate can be concealed under clothing making it more acceptable to patients. There is much less tendency for the frame to strike the contralateral lower leg in the swing-through phase of either leg during ambulation. Hardware removal can be performed under local anesthesia. It imparts a less conspicuous radiographic silhouette compared with traditional fixators allowing ease of assessment of healing of fracture to treating surgeons. Small amounts of axial micromotion may reduce stress shielding of the fracture site. Load sharing during weight bearing may stimulate the developing callus until bony union. Controlled dynamization by removing screws closest to the fracture site is possible, allowing some measure of control to the load sharing process. During plate application, both plate and bone fragment can move independently, making accurate screw placement difficult as small shifts will make the plate translate to great deviations at the level of bone. Unlike the traditional fixation, mono-axial nature of locking head screw trajectory reduces the ability to compensate for imperfect placement, making it mandatory that anatomical reduction should be achieved before placement of the first screw. While traditional constructs can be strengthened by stacking connecting rods, it is not possible for LCP external fixation. Kloen's[15] strategy of double LCP fixation should

be employed in such cases requiring enhanced stability. The consistent good outcome using this "supracutaneous technique" support our opinion of using LCP as external fixator in the tibial fractures which are very well tolerated by patients and address the challenging problems of compound wound healing, non-union, and infection.

REFERENCES

1. McCann PA, Jackson M, Mitchell ST, Atkins RM. Complications of definitive open reduction and internal fixation of pilon fractures of the distal Tibia. Int Orthop 2011;35:413-8.
2. Lau TW, Leung F, Chan CF, Chow SP. Wound complication of minimally invasive plate osteosynthesis in distal tibia fractures. Int Orthop 2008;32:697-703.
3. Hutson JJ Jr. Salvage of pilon fracture nonunion and infection with circular tensioned wire fixation. Foot Ankle Clin 2008;13:29-68.
4. Eralp L, Kocaoglu M. Distal tibial reconstruction with use of a circular external fixator and an intramedullary nail. Surgical technique. J Bone Joint Surg Am 2008;90 Suppl 2:181-94.
5. Cavadas PC, Landín L. Treatment of recalcitrant distal tibial nonunion using the descending genicular corticoperiosteal free flap. J Trauma 2008;64:144-50.
6. Pannunzio ME, Chhabra AB, Golish SR, Brown MR, Pederson WC. Free fibula transfer in the treatment of difficult distal tibia fractures. J Reconstructive Microsurg 2007;23:11-8.
7. Ring D, Jupiter JB, Gan BS, Israeli R, Yaremchuk MJ. Infected nonunion of the tibia. Clin Orthop Related Res 1999;369:302-11.
8. Thordarson DB, Patzakis MJ, Holtom P, Sherman R. Salvage of the septic ankle with concomitant tibial osteomyelitis. Foot Ankle Int 1997;18:151-6.
9. Toh CL, Jupiter JB. The infected nonunion of the tibia. Clin Orthop Relat Res 1995:176-91.
10. Tulner SA, Schaap GR, Strackee SD, Besselaar PP, Luitse JS, Marti RK. Long-term results of multiple-stage treatment for posttraumatic osteomyelitisof the tibia. J Trauma 2004;56:633-42.
11. Collinge C, Kennedy J, Schmidt A. Temporary external fixation of lower extremity. Orthop Healio 2010;33:4.
12. Kerkhoffs GM, Kuipers MM, Marti RK, Werken C. External fixation with standard AO-plates: Technique, indications, and results in 31 cases. J Orthop Trauma 2003;17:61-4.
13. Appivatthakakul T, Sanapanich K. The locking compression plate as an external fixator for bone transport in the treatment of a large distal tibial defect: A case report. Injury 2007;38:1318-25.
14. Woon CY, Wong MK, Howe TS. LCP external fixation – External application of an internal fixator: Two cases and a review of the literature. J Orthop Surg Res 2010;5:19.
15. Kloen P. Supercutaneous plating: Use of a locking compression plate as an external fixator. J Orthop Trauma 2009;23:72-5.

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