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

S Rajasekaran¹, B Jayakumar²

¹Senior Assistant Professor, Department of Orthopaedics, Government Theni Medical College, Theni, Tamil Nadu, India,
²Professor, Department of Orthopaedics, Government Theni Medical College, Theni, Tamil Nadu, India

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

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.
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.

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.\(^5\) 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

<table>
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<th>Table 1: Details of patients</th>
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<tr>
<td>Patient</td>
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<tr>
<td>Velappan</td>
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<td>Muthiah</td>
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<td>Sasikumar</td>
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<td>Anantham</td>
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LCP: Locking compression plate
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