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Supercutaneous plating: A case report of locking plate used as an external fixator

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Abstract

Introduction: Proximal and distal tibial fractures with a compromised soft tissue envelop still pose a treatment dilemma or challenge for the orthopedic surgeon LCPs have advantages of angular stability from the locking-head mechanism and less irritation when compared with traditional external fixators due to their low profiles. Here is a poster case report of the same.

Case Report: A 37-year-old male, flouriest, from Badravathi who came to Orthopedic OPD after he had met with a road traffic accident on 23rd November 2020 and sustained injury to left leg. Plain radiograph revealed fracture of left tibia and fibula at the proximal and middle third junction. Arterial Doppler showed long segment popliteal artery thrombosis.

As a definitive treatment patient underwent Open reduction and plate fixation of proximal third tibia with thromboembolctomy and venous grafting done. The limb post-operative went into compartment syndrome and emergency fasciotomy of left leg was done. Fasciotomy wound got infected and hence Vacuum assisted closure was applied. The same locking plate was removed and used as an external fixator. The External fixation plate for left tibia was removed and the patient was put on patellar tendon bearing cast and is showing good signs of union.

Conclusion: For proximal fractures of the tibia, which are treated by external fixation using the LCP plate is a safe and reliable technique and excellent functional outcomes. There is a high rate of union with minimal complications rate. Its advantages also include ease of performing surgery and ease of removing plate after fracture healing. Though the use of locked plates as external fixators is not a generally acknowledged technique by many surgeons still it has become valuable modality in management.

Keywords: Super cutaneous plating, LCP- locking compression plate, external fixator

Introduction

Tibial fractures are the most common fracture of long bones. These injuries result from high-energy trauma, which lead to disability, with high socioeconomic costs. Proximal and distal tibial fractures with a compromised soft tissue envelop still pose a treatment dilemma or challenge for the orthopedic surgeon. External fixation has seen renewal in modern trauma management as a temporary fixator or definitive treatment for the high-energy tibial injury. Nevertheless, most external fixators for the lower extremities are bulky and cumbersome for the patients, leading to problems with sleeping and dressing, joint stiffness and leg muscle atrophy. External fixators sometimes can even interfere with the contralateral extremity during walking.

Kerkhoffs *et al.* firstly described that they used a locked compression plate (LCP) as an external fixation for treating open fractures, inferior non-union, and arthritis, and Kloen *et al.* called this method as a “supercutaneous plating technique.” LCPs have advantages of angular stability from the locking-head mechanism and less irritation when compared with traditional external fixators due to their low profiles. However, the application of supercutaneous plating technique is still not generally acknowledged. Recently, many authors reported the good clinical results of using external locked plating for treating tibial fractures. Thus, we here report a case of proximal tibia fracture complicated with compartment syndrome postoperatively which was managed with locking plate used as an external fixator to treat fracture of the tibia.

Case Report

A 37-year-old male, flourist, from Badravathi who came to Orthopaedic OPD after he had met with a road traffic accident on 23rd November 2020 and sustained injury to left leg. With the chief complaints of Pain and swelling at the knee since the accident. Swelling the pain was sudden in onset gradually progressive, dull aching type, continuous, non radiating, aggravated on the movements of the knee joint.

On examination

Local examination revealed 1x1cm laceration over the anterolateral aspect of proximal third of the left leg. The limb

was externally rotated diffuse swelling over the proximal third of left tibia which had a cortical defect, crepitation and tender on palpation. There was abnormal mobility at the proximal third left tibia at the site of deformity. The knee ROM could not be assessed due to pain. The distal pulses dorsalis pedis artery was feeble. Active toe movements were present.

Investigations

Plain radiograph anteroposterior and lateral views of left leg full length revealed fracture of left tibia and fibula at the proximal and middle third junction. (Fig.1).



Fig 1: X ray left leg AP and LAT

Treatment

As a definitive treatment patient underwent Open reduction and plate fixation of proximal third tibia with thromboembolctomy and venous grafting done on 26-10-2020. The limb post operative went in to compartment

syndrome and emergency fasciotomy of left leg done 26-10-2020. Fasciotomy wound got infected (Fig.2) and hence Vacuum assisted closure was applied on 9-11-2020. (Fig.3, 4 & 5).



Fig 2: Wound image



Fig 3: Vac application



Fig 4: Vac application



Fig 5: Post vac application wound image

- Due to infection the same locking plate was removed and used as an external fixator. (Fig.6)



Fig 6: Super cutaneous plating



Fig 8: Split skin grafting

- The skin grafting of the fasciotomy wound was done on 30-11-2020. (Fig 7 & 8)



Fig 7: Post vac healthy wound

- The External fixation plate for left tibia was removed on 24-07-2021 (Fig.9) and the patient was put on patellar tendon bearing cast and is showing good signs of union. (Fig.10)



Fig 9: Patellar tendon bearing cast



Fig 10: X ray shows good signs of union

Discussion

Proximal tibial fractures are challenging to treat because of the frequency of substantial soft-tissue injury, subcutaneous surface, the strong deforming forces involved, and the need for accurate alignment. Reduction and stability are dependent on control of the proximal fragment. Soft tissue compromise can present as a component of the injury, or can result from surgical dissection.

Treatment modality of fixation include conservative management, internal fixation- LCP (ORIF/MIPPO), IMIL and external fixation devices. None of the treatment options available perfectly fulfill requirements of fracture characteristics of proximal tibia. With the development of technique of external fixation using a plate which preserve extraosseous blood supply, respect osteogenic fracture haematoma, biologically and stable fixation method is available for proximal tibia fracture gaining popularity.

Indirect reduction method and fixation of the plate screws with small skin incisions in external fixation using plate technique prevents iatrogenic injury to vascular supply of the bone, which finally leads to decreased infection rate better fracture healing. A mechanically stable fracture - bridging osteosynthesis can be obtained without significant dissection and surgical trauma to the bone and surrounding soft tissues. Recently, with the advance of locking plates with angular stability, this technique was used in the management of fracture with complications was called the supercutaneous plating technique.

In this technique the plate was placed on the anteromedial aspect of the tibia, with its broad end close to the knee joint. The broad end of the external fixation LCP plate offers greater versatility for inserting the screws that allow more precise modulation to obtain the greatest bone purchase in the proximal segment. The anteromedial aspect of the tibia is not covered by bulky muscles and important neurovascular structures, and hence, the surface can be clearly palpated, thus, facilitating fast and accurate insertion of screws with less risk of neurovascular injuries.

The plate-bone distance was 20-30 mm, which can increase the stability of fixation. In the present study, an external fixation plate with 8 holes was used. All screws were bicortical. All these features can increase both the axial and torsional stability.

In the current study, the time between injury and operation was 4 days. The duration of surgery was 44 minutes. The period of follow up was 8 months which showed radiological union in 24 weeks. Because of its low profile, the external fixation plate can be easily concealed under the stockings. The patients could walk wearing normal trousers and there was much less tendency for the locking plate to strike the contralateral lower leg during ambulation. Our Study results were consistent with other studies in the literature.

Conclusion

For proximal fractures of the tibia, which are treated by external fixation using the LCP plate is a safe and reliable technique and excellent functional outcomes. There is a high rate of union with minimal complications rate. Its advantages also include ease of performing surgery and ease of removing plate after fracture healing. Though the use of locked plates as external fixators is not a generally acknowledged technique by many surgeons still it has become valuable modality in management. Even though literature on this technique are minimal, it has the advantage of less financial burden to rural population and better acceptance as early mobilization of joints are allowed

Conflict of Interest

Not available

Financial Support

Not available

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