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Case report

Salvage of proximal tibia fracture treated with locked compression plate

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ABSTRACT

The treatment of displaced proximal tibial fractures is challenging. Recent developments in the techniques of internal fixation, including the development of locking plates and minimally invasive surgical techniques have revolutionaries the treatment of such fractures. We present a case of proximal displaced tibial fracture that was treated with anatomical proximal tibial locking plate using minimally invasive percutaneous plate osteosynthesis. Patient made uneventful recovery even after he sustained re-injury and plate bending and was manipulated under anaesthesia for the same.

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1. Introduction

In the recent past the principles of fracture management have been changed from mechanical approach to fracture care to methods considering first of all the biological aspects of the injury.¹ Biological osteosynthesis is characterized by the preservation of bone and soft tissue vascularity and relative rather than absolute fixation.² The concept of minimally invasive percutaneous plate osteosynthesis (MIPPO) has been widely accepted. Locking compression plates (LCP) are now increasingly being used with MIPPO technique, which helps in preservation of biological environment of the fractures. The LCP-bone construct acts as internal fixator which provide

greater stability than conventional plating and can withstand external deforming forces better. The present case highlights the importance of these issues. Preservation of fracture biology during MIPPO and ability of LCP to withstand external forces, both during re-injury and manipulation, ultimately led to fracture union.

2. Case-report

A 35-year-old male patient^c presented to the emergency department with history of fall from motorbike following collision with a car approximately 6 h back. Patient sustained

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^c A written, informed consent was obtained from the patient authorising the treatment, radiological and photographic documentation. He was also informed that the data concerning the case would be submitted for publication and he consented.

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injury to proximal third of right leg. On examination, patient was hemodynamically stable and other organ systems were found normal. Painful abnormal mobility with crepitus was present in proximal third of right leg, however the fracture was closed and condition of soft tissue was acceptable. Antero-posterior and lateral radiographs showed fractures of proximal third of tibia and fibula with large butterfly fragment (involving more than 75% of circumference) with proximal tibial fragment (Fig. 1). Long leg slab was applied and patient was planned for operative fixation of tibial fracture.

The patient was operated with closed reduction with lateral tibial locking plate using minimally invasive percutaneous plate osteosynthesis (MIPPO) technique (Fig. 2). Post-operative period was uneventful and patient was started on quadriceps exercises and active knee bending exercises after 3 days of surgery. Patient was mobilized without bearing weight on operated side. Partial weight bearing was allowed after 6 weeks with a brace.

Patient again sustained a fall following a slip in bathroom 10 weeks after the surgery and presented to the emergency department with the complaints of pain and deformity of the operated part. Radiographs showed 32° of lateral angulation of fracture site with plate bending; however, implant hold was found adequate (Fig. 3). Manipulation under anaesthesia was planned. Should the need arise, all the preparations for revision surgery were made beforehand. MUA was performed and alignment could be restored without implant loosening or breakage. Patient once again was emphasized the importance of brace and protected weight bearing. Patient had full range of movements without any pain after 12 weeks. On follow-up radiographs after 4 months showed abundant external bridging callus (Fig. 4), and after 24 months fracture site was well consolidated (Fig. 5).

Fig. 1 – Antero-posterior and oblique radiographs of knee and proximal leg showing fracture of proximal third of tibia-fibula and large butterfly fragment with fracture of tibia.

Fig. 2 – Post-operative radiograph of the patient showing lateral anatomical proximal tibial locking plate in-situ.

3. Discussion

The minimally invasive surgery (MIS) is the recent choice in modern surgery as it minimizes the damage of soft tissues thus reducing post-operative pain and infection so as to start an early rehabilitation protocol for better functional recovery. The development of locking implants has allowed the use of

Fig. 3 – Follow-up radiographs after sustaining re-injury showing 32° of lateral angulation over fracture site with plate bending. Minimal external callus formation can be seen around both tibia and fibula fractures.

Fig. 4 – Follow-up radiographs after 4 months of manipulation under anaesthesia showing abundant external bridging callus.

minimally invasive approaches often allowing unilateral plating with improvement in the handling of soft tissues.^{3,4} Destruction of the blood supply of fragments during surgery is minimized with this technique which helps in preservation

Fig. 5 – Follow-up radiographs after 24 months showing well consolidated fractures of tibia and fibula.

of the biological environment of fracture, thus promotes fracture healing.

Conventional open reduction and internal fixation of high energy unstable proximal tibial fractures often results in high incidence of complications like infection, tegumentary necrosis, and wound dehiscence.⁵ The studies have shown that minimally invasive techniques improve the rate of fracture healing by limiting the soft tissue elevation.^{3,6–8}

The locking plate is designed in such a way that there are threads on under-surface of screw head and screw hole of the plate, the pitch of which corresponds with the pitch of screw. The LCP-bone construct rendered angular stable as the threads of screw head are secured firmly against the threads in the plate hole. Thus, a plate is not necessarily in contact with the bone to be fixed and works as an internal fixator.² The fact that present case was operated with locked compression plate, we planned manipulation under anaesthesia. A simple plate would not have sustained such deforming forces during re-injury and manipulation, and would have resulted in the implant loosening and malalignment. We could not find any report in Medline/Index Medicus based literature search that manipulation under anaesthesia was performed for plate bending secondary to re-injury.

4. Conclusion

Proximal tibial fractures treated with LCP can be manipulated under anaesthesia in the event of plate bending due to re-injury. Because LCP provide angular stability and technique of MIPPO retains the fracture biology, manipulation under anaesthesia may be justified in these cases. Before attempting manipulation in such cases, one should ascertain the stability of LCP-bone construct and progression of fracture healing. Never-the-less, one should be prepared with the armamentarium for revision surgery, should the need arise.

Conflicts of interest

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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