

TIBIAL PLATEAU FRACTURE FIXED BY LOCKING COMPRESSION PLATESSanjay K. Gupta¹, V. P. Pathania², Utkal Gupta³, Arjun Gandotra⁴**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: BACKGROUND: High energy complex tibial plateau fractures are usually associated with severe soft tissue injury overlying the fracture. Locked compression plating has clear biomechanical advantages and less iatrogenic tissue damage when compared with conventional plating. **MATERIAL AND METHOD:** Between January, 2012 to June, 2013, 20 patients with Tibial plateau fractures were included in this prospective study. All fractures were treated with locked compression plating using open/MIPO approach. Clinical and radiological data, including fracture pattern, changes in alignment, local and systemic complications, and hardware failure and fracture union were analyzed. **RESULTS:** Twenty patients have been evaluated, with mean follow up of 13 months fractures were treated percutaneously in 30% of cases. All but 1 fracture progressed to union at a mean of 15.5 (14-18) weeks, 95% cases had acceptable anatomical and functional outcome (Rasmussen's criteria). **CONCLUSION:** Biomechanically, this plate works as an "Internal fixator" rather than a plate. It preserves periosteal blood supply and provides fixed angle stability. **KEYWORDS:** Locking compression plate, Tibial Plateau Fracture

INTRODUCTION: In recent years, due to increase in the high velocity trauma, there is increase in high energy complex tibial plateau fractures.^{1,2} These are usually associated with extensive soft tissue and bony injury which results in high complication rate like infection, necrosis of overlying soft tissue, varus collapse, knee stiffness, articular mal reduction and a consequent secondary osteoarthritis.³

The management of these fractures is still controversial. Non operative modalities like casts⁴, braces⁵ or traction^{6,7} have risks of poor clinical outcome and prolonged hospital stay. As multiple methods of internal fixation are available, each fracture requires individualized decision-making to achieve sound union with good range of knee movements. Recent advancement in angle stable locking plate technology has allowed for a new approach to these difficult fractures.⁸

Although its external appearance is very similar to conventional plate it functions biomechanically more like external fixator. Due to this design, these plates preserve the periosteal blood supply and give good fixation even in osteoporotic bone. The purpose of this study is to see whether fixation by locking compression plate is an effective method in the management of tibial plateau fractures.

MATERIAL & METHOD: This is a prospective study carried out on 20 patients with tibial plateau fractures between January 2012 to June 2013. Exclusion criteria's are included local infection, open fracture, children with open physis, previous osteotomy, compromised vascularity, pathological fracture. In preoperative planning soft tissue condition was looked into. If abrasion & blisters or massive swelling was present, surgery was delayed till skin regained its creases and wrinkles. Fractures were classified according to A.O. classification after radiographic evaluation.

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The patients were placed supine on fracture table to allow access to the image intensifier closed reduction of fracture was done. Anteromedial / Anterolateral open approach/MIPO approach was used. The appropriate length of locking compression plate was determined by placing a plate along the anterior aspect of leg and adjusting it so that the proximal end of the plate was just below the joint line and the distal end extends at least 3-4 screw holes beyond the distal limit of tibial fracture. Initially proximal end of plate secured to condyle and then distal end to the shaft. When bone defect was left behind in the metaphysis, it was filled with autogenous bone graft.

Post operatively check x-ray was taken to assess the reduction. Intravenous antibiotics were continued for 3 days. Mobilization was started as soon as patient permitted, first with non-weight bearing crutch support walking, and then progressive weight bears depending upon callus formation. The patients were followed up at 6 weeks, 3 month, 6 months and 12 months. In every follow up, the patients were assessed both clinically and radiologically for union and range of motion at knee according to Rasmussen's criteria.

RESULTS: 20 cases of Proximal tibia fractures were treated with locked plating. There were 14 males & 6 females enrolled. The mean age of our patients was 41.7 years with a ragging from 19-65 years. Except for 5 cases that had fall from height, all other cases were due to road traffic accident. All 20 patients included sustained closed type of fracture, 9 cases were associated with other injuries. There was no mortality.

Mean time between injury and surgery was 6.65 days (range 1-20 days). In 3 cases the delay was due to massive swelling and bad skin condition. Out of 20 cases, there were 2 (10%) case of type 41 A3, 4 case (20%) case type 41B1, 4 (20%) case of type 41 B2, 3 (15%) case of type 41B3, 2 (10%) cases of type 41 C1, 2 (10%) case of type 41C2 and 3 (15%) case of type 41C3 fractures. 30% cases were operated per cutaneously. Only in 5 cases, bone grafting was done. Mean duration of hospital stay was 16 days.

The mean follow up was about 13 months (range 8 to 17 months). Radiological union was seen during 14 to 18 week with mean time to union being 15.5 weeks, except in one case where union was seen in 24 weeks. The average overall range of knee motion was 106.75 degrees. At the latest follow up 16 case had achieved 0° to 120° of motion in, 3 patients range of knee motion achieved was 0-5 (extension lgg) to 90° (flexion) and only one patient the range of motion was >5° (extension lgg) to 90° (flexion).

Out of 20 cases, 16 cases had no pain but 2 cases had persistent pain at the site of implant and two had mild pain after long walks or sports. Out of 20 cases, 19 cases (95%) had acceptable results without significant depression <5mm and condylar widening <5 mm or varus/valgus angulation >10°. 1 case (5%) had unacceptable results with more than 10° angulations (Varus).

Final end results, as per the Rasmussen's criteria, were 12 Excellent, 6 good, 1 fair and poor 1 result. Out of 20 cases, deep infection occurred in 1 case and superficial infection in 2 cases. All cases healed after appropriate antibiotics and antiseptic dressing. Stiffness of knee joint was seen in 4 cases only. One case developed delayed union which was 24 weeks. Minor complications like extension lag occurred in 4 cases and wound gaping in 1 case.

DISCUSSION: In tibial plateau fractures, being intra articular, the goal is anatomic reduction and stable fixation of intra articular fragments along with ability to restore normal mechanical alignment of the limb with early mobilization enabling faster rehabilitation.

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Other methods like Intra-medullary nailing, external fixators and conventional plating are also used for fixation. Angular mal alignment and malunion have been reported with intramedullary nailing.^{9,10} Studies involving external fixation techniques shows complications such as loosening of pins, malunion, imperfect articular reductions and pin tract infections.¹¹

However, in high energy, complex tibial plateau fractures, conventional plating has been associated with a high rate of wound complications and deep sepsis, hardware failure, delayed union and nonunion.^{12,13} In these cases, conventional plate osteosynthesis requires excessive dissection through injured soft tissue envelop and compression of plate to the bone and relies on friction at the bone plate interface and thereby causes compression of periosteal blood supply and de vitalization of bone fragments. Additionally it also does not provide fixed angle stability between plate and screws.

In our study, all fractures progressed to union in 14-18 weeks except one in which fracture united 24 weeks. We used primary bone grafting in 25% cases. There were acceptable anatomical and functional results in 19 Cases (95%) (Rasmussen's criteria). More over complications occurred in 3 cases (15%) and these were superficial (15%) and deep infection (10%). Other studies cole et al¹⁴ & Sanguen SS et al¹⁵ have also shown such results.

CONCLUSION: The locking compression plate system provided stable fixation in this series of patients with tibial plateau fractures. The overall complication rate was low and anatomical and functional outcome was acceptable in 95% cases in mean follow up of 13 months. We found 95% of simple and complex fractures progressed to union and deep infection rate was 10%. However, the fixation techniques are demanding and the surgeon needs considerable experience with locking plate technique especially in percutaneous approach. Further prospective, randomized studies are desirable to confirm our findings and to eventually draw safer conclusions.

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PRE-OP



POST-OP



After 3 Months

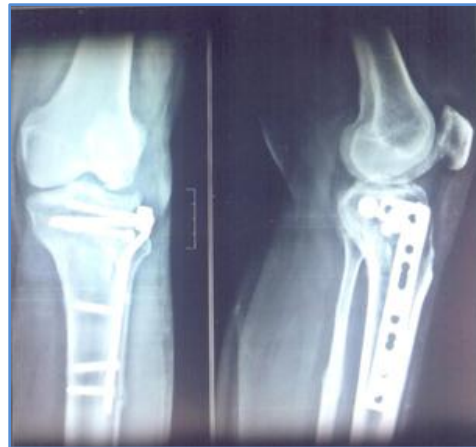
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CASE 1



PRE-OP



POST-OP



After 3 ½ Months

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CASE 2

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