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Posterior coronal plating for tibial fractures: technique and advantages

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【**Abstract**】**Objective:** Tibial shaft fractures are straightforward to treat but when associated with soft tissue injury particularly at the nail entry/plate insertion site or there is significant comminution proximally or a large butterfly fragment/a second split component in the posterior coronal plane, it is a challenge to the treating surgeon. The aim of the present report is to describe the technique of posterior coronal plating in such a scenario and its advantages.

Methods: Between July 2008 and June 2011, 12 patients were prospectively treated by this approach using 4.5 mm broad dynamic compression plates.

Results: The time of bony consolidation and full weight bearing averaged 21.7 weeks (range, 16-26 weeks). Patients were followed up for at least 24 months (range, 24-48 months). At 1 year postoperatively, no loss in reduction or alignment was observed. Mean Hospital for Lower Extremity Measurement Functional Score was 72.8 (range, 64-78). All patients were satisfied with their treatment outcomes.

Conclusion: Direct posterior approach and fixation using prone position helps to visualise the fracture fragments and provide rigid fixation. The approach is simple and extensile easily, apart from advantages of less soft tissue and hardware problems compared to standard medial or lateral plating.

Key words: ***Tibial fractures; Bone plates; Orthopedic procedures***

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Tibial fractures caused by high-energy trauma are often associated with severe soft tissue injury.[1] While the general consensus among surgeons is to operate and internally fix these types of fracture; the choice of implants and approach is variable.[2] Fractures with comminution associated with predominant large butterfly split component in the posterior coronal plane are difficult to reduce and achieve fixation by conventional means. Not much has been written in the literature about these fractures. Sometimes soft tissue condition on the anterior aspect impedes the use of hardware. Although external fixator has been used as temporary procedure in many instances, it is later converted to definitive treatment due to lack of options. Recently the Ilizarov ring fixator has been used successfully to deal with complex tibial fractures; the technique is demanding and high complication rate may appear in inexperience hands.[3,4] We describe a direct posterior approach that provides access to the entire posterior tibia with adequate fixation using a simple dynamic compression plate.

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METHODS

Surgical technique

Under spinal anaesthesia, the patient was placed in a prone position (Figure 1A). A high-thigh pneumatic tourniquet was applied to the injured extremity. A scrubbed assistant held the leg in position. The surgeon stood on the medial side of the limb to be operated. An inverted L-shaped incision was made, centring the horizontal limb at the popliteal crease. The medial arm of the incision was made just posterior to the medial edge of the tibia. The vertical limb of the incision could be extended depending upon the length of the exposure required (Figure 1B). The skin up to the deep fascia was elevated as single flap and next the gastro-soleus was retracted laterally with Hohmman's retractor. The soleal origin along the medial tibial border was identified

and the muscle erased from the tibial shaft (Figure 1C). The neurovascular bundle lying between the gastro-soleus remained protected. Proximally the medial condyle could be exposed through a postero-medial gastronemius approach by simply extending the approach. The coronal split posterior fragment was reduced anatomically under direct visualization, and large dynamic compression plate could be contoured (Figure 1D) and placed on this surface (Figure 1E). Adequate numbers of screws were inserted and the fixation could be checked with flexion and extension. The hardware remained covered with muscles which were just allowed to fall on their own. After a suction drain was applied deep and the thick fascia covered the muscles, the subcutaneous tissue was sutured and the skin stapled. Postoperatively the limb was kept elevated and active toe movements were advised.

After negative suction drain was removed, patients were encouraged for active limb movements to regain full knee and ankle range of motion. Weight bearing was restricted to toe-touch (5-10 kg) during the first 2 months and increased progressively in the third month. Full weight bearing was not permitted before 3 months.

Patient series

Between July 2008 and June 2011, 12 patients were prospectively treated by this approach using 4.5 mm broad dynamic compression plates. Eight males and 4 females with a mean age of 47 years (range, 39-60 years) were included. The fractures according to AO/OTA were four B3, three B1, two each of A1, A2 and one C1. Seven patients were injured by traffic accidents, and 5 by falls from a height. Five patients had associated fractures: 2 contralateal femur, 1 ipsilateral humerus, 1 distal end radius fracture, and 1 ipsilateral patella. Mean time from injury to operation was 5.9 days (range, 3-12 days).

RESULTS

No cases of infection were observed. One patient had a superficial dehiscence postoperatively that healed without further treatment. The time of bony consolidation and full weight bearing averaged 21.7 weeks (range, 16-26 weeks). Patients were followed up for at least 24 months (range, 24-48 months). At 1 year postoperatively, no loss in reduction or alignment was observed. Mean Hospital for Lower Extremity Measurement Functional Score was 72.8 (range, 64-78).[5] All patients were satisfied with their treatment outcomes.

Four illustrative cases of communited tibial shaft fracture operated on are presented in Figures 2-5.

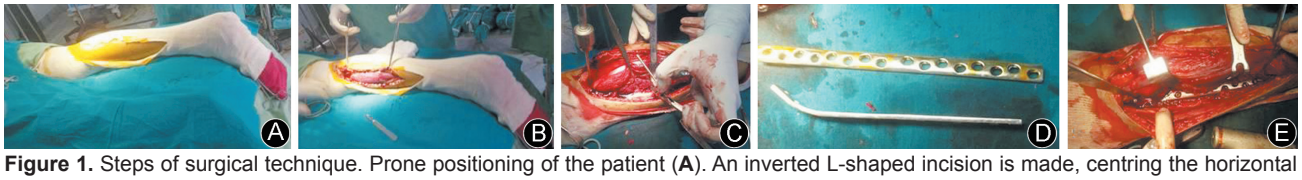

Figure 1. Steps of surgical technique. Prone positioning of the patient (**A**). An inverted L-shaped incision is made, centring the horizontal limb at the popliteal crease. The medial arm of the incision is made just posterior to the medial edge of the tibia (**B**). The soleal origin along the medial tibial border is identified and the muscle is erased from the tibial shaft. Fracture is reduced (**C**). Proper plate contouring is done (**D**). Adequate numbers of screws are inserted and the fixation can be checked with flexion and extension (**E**).

Figure 2. Patient failed interlocking in proximal tibial fracture with coronal split. Preoperative radiographs (**A**). Postoperative radiographs showing well stabilized fracture (**B**). Subsequent follow-up X-rays after 30 months of surgery (**C**). **Figure 3.** Patient with proximal third tibial fracture with coronal split and anterior soft tissue injury. Preoperative radiographs (**A**). Follow-up radiographs showing consolidating fracture (**B**). Subsequent follow-up X-rays after 23 months of surgery (**C**).