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Proximal tibia non-union: A case report and review of literature

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Abstract

Fractures of proximal tibia are common yet serious injuries, if not treated well, it results in significant functional impairment. The treatment of metaphyseal nonunions can be particularly difficult, and may present unique issues compared to diaphyseal nonunions. The first main variable the surgeon needs to consider is whether the nonunion site is capable of a biologic response. While the biologic capability is usually preserved in metaphyseal bone, severe osteopenia may exist due to prolonged immobilization or limited weight bearing. The soft tissue envelope may be compromised due to traumatic devascularization or chronic infection. Both of these factors may act to devitalize a short periarticular fragment and may make stable internal fixation difficult. Locking periarticular plates for the proximal tibia may be advantageous for achieving implant stability and restoring anatomic alignment. We present you a case of 11 months old operated Schatzker type 6 right proximal tibia non-union treated with fibrous tissue excision, freshening of fracture site, cancellous bone grafting and open reduction internal fixation with plating and encircled wiring with fibulectomy.

Keywords: Proximal tibia, non-union, corrective osteotomy, fibulectomy, locking plate

Introduction

Proximal tibia fractures are serious injuries as it involves major weight bearing joint surface of the knee. With increasing high velocity trauma, the surgeon has to deal with complex injuries with severe soft tissue compromise. High energy fractures are associated with complex fractures patterns, intra-articular involvement, severe comminution and displacement where as wedge depression and pure depression type are one seen in the low energy group. These fractures are also predisposed to complications like compartment syndrome and injury to the neurovascular structures and soft tissue envelope. Proximal tibia region is notable for a rich vascular supply and a large cross-sectional area of metabolically active trabecular bone, which usually allows for reliable healing ^[1, 2]. Nonunion of the proximal tibia is a relatively rare clinical entity. The several clinical series that exist in the literature concerning both extra-articular proximal tibia fractures and tibial plateau fractures mostly document nonunion rates less than 3% ^[3, 4, 5]. The objective of treatment is to attain fracture union with a stable knee joint with a functional painless range of motion. Conventional treatment modalities to achieve the desired result have included non-operative modalities like cast, braces and traction; percutaneous wires with external/ hybrid fixators and single or dual plating methods. Each of these methods has its limitations prompting the search for better techniques and implants. We evaluated clinical and radiological outcome of 11 months old non-union of type 6 schatzker proximal tibia fracture treated with fibrous tissue excision, freshening of fracture, fibulectomy, cancellous bone grafting and open reduction and internal fixation with locking compression plating and quadriceps tendon bearing encircled wiring.

Case presentation

We present a case of 60yr old male with 11 months old history of operative intervention with debridement and external fixation for open grade 2 proximal tibia fracture (Schatzker type 6). Patient presented to us with complain of deformity at right knee and inability to bear weight on right lower limb.

Physical examination revealed 15 degrees of genu varum and 30 degrees of knee flexion deformity with further flexion upto 80 degrees at right knee along with abnormal mobility at right proximal tibia fracture site. Opposite knee also had 10 degrees of varus and 25 degrees of flexion deformity.

Radiological evaluation showed non-union at right proximal tibia fracture site along with osteoarthritis changes of both knees (fig 1).

After taking consent, under Spinal anaesthesia, in supine position, using medial para patellar approach the fracture site was freshened and fibrous tissue was excised at the fracture site. Fibulectomy was done at middle one third level to correct the deformity. After appropriate reduction and autologous cancellous bone grafting, fixation of the tibial fracture was done using anatomical locking compression plating laterally. A tibial tuberosity fragment was fixed with a 4.5mm cortical lag screw and this fixation was augmented by a quadriceps tendon bearing encirclement wire (fig 2). Correction of varus and flexion deformity was achieved (fig 3).



Fig 1: X-ray showing proximal tibia non-union

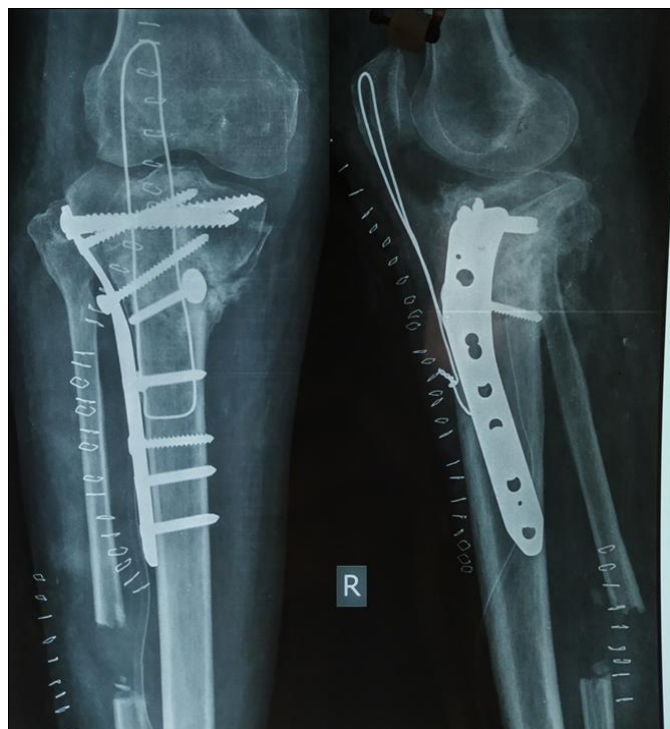


Fig 2: X-ray picture showing fixation with locking compression plate with bone grafting and encirclement wire



Fig 3: Clinical picture showing correction of varus and flexion deformity



After suture removal at 12th day post op, patient was advised active knee range of motion and non weight bearing walking with walker. At 1 month, encirclement wire was removed under short GA (fig 4). With regular follow-up at every month, patient was allowed partial weight bearing at 3 months and full weight bearing at 4 months as fracture showed clinical and radiological signs of union. At 8 months, patient was bearing full weight and performing activities of daily routine without any difficulty.



Fig 4: X-ray image showing fixation after 1 month

Discussion

Nonunion of proximal tibia fractures is an exceedingly rare entity. When encountered, reliable osteosynthesis is often complicated by the small remaining articular fragments, osteopenic bone, and post-surgical scarring leading to limited mobility and devascularisation of the fracture fragments [6]. When nonunions develop, their management can be especially challenging due to tenuous soft tissues and a short articular segment. In the coronal plane, anterior compartment musculature or an errant starting point frequently leads to valgus angulation, and lateral buttress plates may not control medial collapse when comminution exists, leading to varus deformity. These deformities may progress subsequently due to poor implant purchase of varying degrees. Traditional implants which have been used to treat proximal tibial fractures may not have been ideal for metaphyseal fixation [7, 8]. Treatment of these non-unions consist of proper clinical and radiological evaluation, mechanical axis and deformity correction, bone grafting and fixation. Mobilisation and reduction of the nonunited fragments was achieved with elevators and K-wires after arthrolisis of the knee to aid in visualisation. Blood flow to the fracture was restored by using a drill to open the medullary canal. Provisional reduction was achieved using K-wires, and iliac crest graft, cortical fibular graft or demineralised bone matrix with BMP was used to fill any metaphyseal voids. Final fixation consisted of locking compression/buttress plating [9]. Locking screws proximally may allow for improved fixation, allowing for maximal compression across the fracture using the tensioning device. Additionally, using a laterally-based plate in the tension band position is biomechanically sound [10], and the use of lag screws and the articulated tensioning device may allow the plate to become more of a load-sharing device and improve overall construct stability.

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