Management of Segmental Tibial Fracture with Composite Fixation - Technical Aspect

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Abstract: Fracture reduction of the proximal tibia is technically challenging in terms of attaining coronal and sagittal alignment by surgical reduction and fixation. Especially in a segmental fracture tibia with proximal third involvement difficulty arises in terms of choice of implant, approaches and complications especially malalignment. This demonstrative case is of a 35 year old woman involved in a car versus motorcycle collision sustaining an open, proximal right tibia and fibula fracture. Extensive soft tissue stripping and exposed bone was noted at presentation. Plantar sensation was intact; dorsalis pedis and posterior tibialis pulses was felt. Surgical debridement and temporary stabilization was urgently performed. Subsequent composite fixation was performed using proximal tibial locking compression plate and intramedullary stabilisation using patellar tendon splitting technique for tibial nail insertion. Bone healing without infection was able to be achieved with good clinical outcome. Sometimes additional forceps and implants are needed to secure stability.

Keywords: composite fixation, patella tendon splitting technique, tibia nailing and plate

INTRODUCTION:

Proximal tibial fractures present a clinical and technical challenge because of the difficulty of obtaining and maintaining reduction until fracture union [1-4]. Reduction and fixation with intra medullary devices requires surgical adjuvants like additional anterior plating for sagittal alignment that are commonly used to overcome these challenges. Special concern has to be given for segmental tibial fractures for intramedullary nailing. Proximal tibial plating with patellar tendon splitting technique in the flexed hanging position can be a useful technique in the treatment of these difficult injuries. Biomechanical studies underline superior stability in unstable proximal fractures [14].

CASE REPORT

This case report concerns a 35-year-old woman motorcycle passenger injured after being struck by a car. She was initially transported to a tertiary hospital nearby from the accident scene, where they have given first aid and then she was referred to our hospital from there. The patient was awake and alert with a GCS of 15. She was hemodynamically stable with her only complaint of pain to her right lower extremity. The patient relayed no significant current medical problems, medical history, surgical history, or previous injury to her right leg. Her family history was negative for musculoskeletal disease, bleeding dyscrasias, or problems with anaesthesia. The musculoskeletal assessment of her bilateral upper extremities, pelvis, spine, and left lower extremity was negative. An isolated injury to her right leg below the knee was noted with exposed muscle and bone. Detailed evaluation of the right lower extremity revealed intact plantar sensation. Plantar flexion of the ankle and toes was noted to be intact. Extensor function at the foot was present along with dorsal foot sensation. Vascular examination revealed dorsalis pedis and posterior tibial is pulses were felt. Broad spectrum IV antibiotics for gram positive and gram negative organisms and tetanus toxoid were urgently administered. Radiologic evaluation confirmed the diagnosis of right tibial and fibular fracture with a proximal, segmental fracture pattern.

The final diagnosis was a type III A open segmental right tibia and fibula fracture with proximal one-third involvement. Investigations confirmed fractures at 2 sites that are proximal end and other at diaphysis. By principle of fixation, proximal fracture requires fixation by absolute stability and diaphyseal requires relative stability. Long plate could have been an option but ruled out as plate fixation for a weight bearing bone is biomechanically inferior to intramedullary device. Recon nail alone could be an option, but ruled out as it is technically demanding to have critical entry point. Moreover it requires accessory fixation devices like anterior plating. So we chose a composite fixation option, where proximal fracture fixed with plate and diaphyseal fracture stabilised with a composite fixation option, where proximal fracture fixed with plate and diaphyseal fracture stabilised with a locking compression plate and an anterior plating.
intramedullary device. Emergency orthopaedic intervention was undertaken. Surgical Debridement of the open wound was done. Definitive stabilization of fracture with placement of proximal tibial locking compression plating and reamed locked tibial intramedullary nailing was done through patellar tendon splitting technique.

Fig 1: X-ray shows: proximal1/3rd tibial involvement with extension of proximal fragment

Fig 2: CT-Scan: confirmed no intra articular extension but close to metaphysis

Fig 3: C-Arm pic showing composite fixation of segmental fracture with proximal tibial lcp and intra medullary nail

DISCUSSION:

The patient was discharged to home at 14 days after injury. Initial follow-up occurred at 2 weeks after discharge noting no clinical signs of infection. Sutures were removed and full range of motion was allowed. Follow-up occurred 8 weeks after discharge where the initial postoperative x-rays were obtained. Maintenance of reduction and early callous formation were noted. Progressive weight bearing as tolerated was allowed. Formalized physical therapy was also ordered. Radiographs at that time revealed interval callus formation and well-maintained alignment. Active Knee range of motion from 5-100 degrees and passive range of motion was from 0 to 25 degrees. Nail design has evolved to provide improved interlocking options with superior biomechanical stability as compared with traditional tibial nailing or plating [8, 9]. As an alternative, the hybrid external fixator may be applied [10].
CONCLUSION:
Fractures of the proximal tibia present a challenging problem particularly from a surgical reconstruction perspective. An option for surgical repair is done using plating and nail fixation. Post op period for 8 months we have reviewed. Patient is normal, active and passive range of movements is full. Patient is able to do his daily routine activities.

REFERENCES


