

PROXIMAL TIBIA NON-UNION WITH IPSILATERAL FRESH FRACTURE OF MID-SHAFT OF TIBIA: A CASE REPORT AND REVIEW OF LITERATURE

ABSTRACT

Proximal tibial fractures are one of the common fractures of the lower limb, when not treated properly, can lead to functional impairment. Although the risk of proximal tibia non-union is relatively low after surgical treatment, there are still reported cases of non-union. Although the proximal tibial metaphyseal region has rich vascularity, non-union can occur due to poor bone quality as in osteopenia in bedridden patients, or due to the nature of trauma that damages the blood supply to the fracture fragment. When proximal tibia non-union occurs in combination with ipsilateral tibial mid-shaft fracture, it hinders the possibility of intramedullary interlocking nail fixation for tibial shaft fracture. We are presenting you a rare case of 1 1/2 year old operated Schatzker type 6 right proximal tibia non-union along with fresh ipsilateral tibial shaft fracture treated by proximal fibular osteotomy, excision of fibrous tissue at non-union site, lifting and freshening the fracture, open reduction and internal fixation with plating augmented by cancellous bone grafting and closed reduction and internal fixation of tibia shaft fracture using Enders nails.

KEYWORDS: Proximal tibia, non-union, locking plate, Enders nail, fracture, tibia mid-shaft

INTRODUCTION

Proximal tibial plateau fractures need to be treated with special care as it is involved in load transmission across the knee joint. Therefore, nonanatomic reduction may lead to functional impairment of the knee joint. Although the proximal tibia has a good extraosseous blood supply [1,2], non-union can occur in rare situations. Non-union of proximal tibial fractures are very rare and have been reported in only 1 to 3% of cases [3,4,5,6]. This may be due to immobilization osteopenia, or due to the nature of trauma as in high energy trauma causing Schatzker type 6 fracture damaging the periosteum, soft tissues and blood vessels. Conventional treatment of tibia mid-shaft fracture includes the use of intra-medullary interlocking nail. But, in the presence of proximal tibia non-union, management of tibia mid-shaft fractures becomes a challenging issue for the surgeon. Though Enders nails give only relative stability, it provides good tension at fracture site leading to good callus formation and union. The outcome, both radiological and clinical, were evaluated for a 1 1/2 year old non-union of operated schatzker type 6 proximal tibia with fresh fracture of ipsilateral tibia mid-shaft treated by fibular osteotomy, excision of overgrown fibrous tissue at non-union site, lifting and freshening of fracture, open reduction and internal fixation with triple plating and Enders nailing for tibia mid-shaft fracture.

CASE PRESENTATION

This is a case of 42 year old male with 1 1/2 year old history of surgical intervention with plating for closed schatzker type 6 right proximal tibia fracture. Patient was having right knee pain and had difficulty bearing weight over right lower limb. Furthermore, the patient also sustained an ipsilateral closed tibia mid-shaft fracture.

On clinical examination, there was slight varus deformity of knee and restriction of knee flexion after 70 degrees. Tenderness was present at proximal tibia. A Fracture of ipsilateral tibia at mid-shaft was revealed on examination.

Radiological studies including x-rays and CT scans were done (Fig 1), which confirmed non-union of the right proximal tibia with an implant, collapse of medial tibial condyle, and ipsilateral tibia mid-shaft fracture. There were three separate fracture fragments in proximal tibia, one anteromedial fragment, one posteromedial fragment and one lateral fragment as per CT scan analysis.

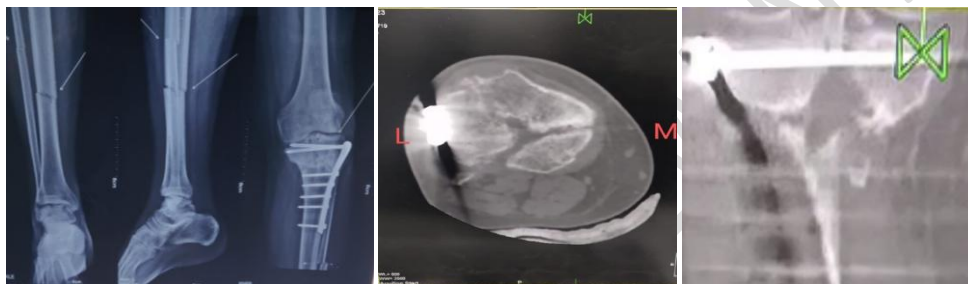


Fig 1: Radiological imaging

PROCEDURE

Consent was taken for surgery. Under Epidural anaesthesia, patient was kept in supine position with bump under right knee joint. Non-union of proximal tibia was addressed first by 2 separate incisions (anterolateral and posteromedial) before addressing the tibia mid-shaft fracture. Fibular osteotomy was done through a mini-incision over fibula. Implant removed through anterolateral incision. Fibrous tissues present over anterolateral fragment were excised and the fragment was elevated and fracture ends freshened. Through a posteromedial incision, anteromedial and posteromedial fragments were addressed by excising the fibrous tissue at the non-union site, elevation of fracture fragments, and freshening of fracture ends (Fig 2). Under fluoroscopy guidance, anatomical reduction of articular margin was maintained and fixed using locking compression plates (Fig 3). One plate was kept over lateral aspect, one on anteromedial aspect and one on posteromedial aspect. Cancellous bone grafts were used to fill the fracture gaps.





Fig 2: Fracture site elevated after removal of excessive fibrous tissue growths and fracture sites freshened.



Fig 3: Fixation with Locking compression plates after keeping cancellous bone graft at fracture gaps

Tibia mid-shaft fracture was addressed using Enders nails (Fig 4). Enders nails were passed from distal to proximal after maintaining closed reduction of the fracture. A total of 3 Enders nails were used.

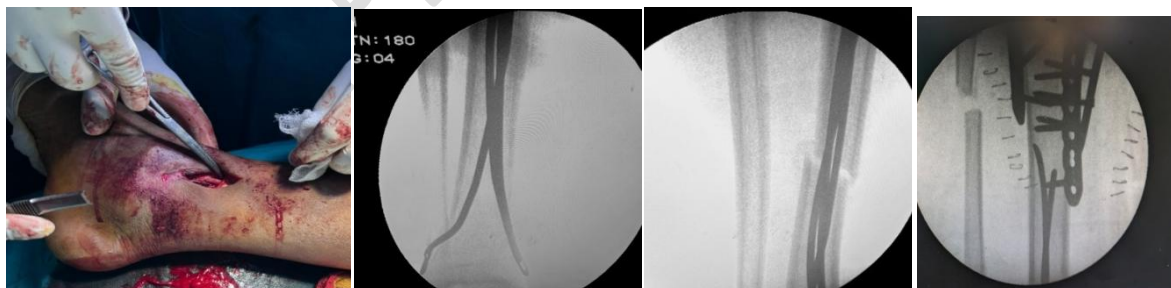


Fig 4: Fixation of Tibia mid-shaft fracture with Enders Nails

A below knee plaster slab was applied post-op. Passive motions were advised on POD 1. Suture removal was done on POD 10. X-ray follow-up after 1 month revealed signs of union of both proximal and mid-shaft tibia. Knee range of motion improved significantly (Fig 5). Partial weight bearing started at 2 months and full weight bearing started at 4 months. Patient was able to fully weight bear without any pain, doing daily activities.



Fig 5: X-Ray at 1 month follow-up showing significant callus formation and signs of union. Flexion and Extension of knee returned to normal range

DISCUSSION

Non-union following surgical fixation of fractures of the proximal tibia are very rare. If not addressed with caution, it can be debilitating to the patient causing pain and functional impairment. Non-union of proximal tibia itself is challenging to the surgeons due to less soft tissue coverage and open procedures add further insult to soft tissues and vascular supply. Thorough clinical and radiological evaluation is necessary for giving proper treatment. When proximal tibia non-union is present along with ipsilateral tibia shaft fracture, it adds to the difficulty as conventional intramedullary interlocking nails cannot be used to fix tibial shaft fracture due to presence of the non-union. In such cases, addressing the nonunion by excision of fibrous tissues, freshening of non-union ends after lifting the fracture fragments, k wires to maintain temporary anatomical reduction and definitive fixation using locking compression plates [7] augmented by cancellous bone grafting at fracture gaps followed by Enders nailing to address the tibia mid-shaft fracture is the best option to obtain a good clinical and radiological outcome. Though Enders nail gives only relative stability, it provides good elasticity at the fracture site leading to good callus formation and a good union [8,9,10].

REFERENCES

1. Borrelli J Jr, Prickett W, Song E, Becker D, Ricci W. Extraosseous blood supply of the tibia and the effects of different plating techniques: a human cadaveric study. J Orthop Trauma. 2002;16(10):691–5.
2. Carpenter CA, Jupiter JB (1996) Blade plate reconstruction of metaphyseal nonunion of the tibia. Clin Orthop Relat Res 23–28.
3. Choo KJ, Morshed S. Postoperative complications after repair of tibial plateau fractures. J Knee Surg. 2014;27(1):11–9.
4. Papagelopoulos PJ, Partsinevelos AA, Themistocleous GS, Mavrogenis AF, Korres DS, Soucacos PN. Complications after tibia plateau fracture surgery. Injury. 2006;37(6):475–84.
5. Anglen JO, Healy WL. Tibial plateau fractures. Orthopedics. 1988; 11:1527-1534.

- 152 6. Ebraheim NA, Sabry FF, Haman SP. Open reduction and internal fixation of 117
153 tibial plateau fractures. *Orthopedics*. 2004; 27:1281-1287.
- 154 7. Singh Charan, Jagdish; Singh, Vishal; Gundavarapu, Avinash1; Kumar, Shashi H.
155 K.2. Functional outcome of proximal tibia fractures (Shatzker's type V and VI) fixed
156 with open reduction and internal fixation with dual plate osteosynthesis. *Journal of*
157 *Orthopaedics and Spine* 10(1):p 6-12, Jan–Jun 2022.
- 158 8. Kenwright J, Richardson JB, Cunningham JL, Axial movement and tibial fractures: a
159 controlled randomized trial of treatment. *J Bone JointSurg Br* 1991;73:654-9.
- 160 9. Yamaji T, Ando K. Usability of elastic intramedullary nailing for fractures. *Fracture*
161 *1997;19:445-9.*
- 162 10. Yamaji T, Ando K, Seki T. The influence of flexible fixation on callus formation.
163 *Fracture 1998;20:343-5*