Original Article

Case Report On Management Of Compound Tibial Fracture Type IIIB With External Fixator Followed By Nailing Procedure

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Abstract

Open fractures of the tibia are one of the most common compound fractures seen in orthopedic practice. These result in severe soft tissue injury and at times associated with vascular injuries which pose a great challenge in management. Gustilo-Anderson's classification is the most commonly used for open fractures of the tibia [type I,II, III (A,B and C)]. Our case includes a 30-year-old male presented with complaints of open injury to the right lower leg post a road traffic accident. Has pain, bleeding, and is unable to bear weight. A 15cm open lacerated wound was seen on the proximal part of the right lower limb. Multiple lacerations were seen on the right foot. It was diagnosed as a Case of Type IIIB compound fracture of the Tibia with periosteal stripping. This case was managed with a repeated debridement, uniplanar unifocal external fixator initially for the first 4 weeks followed by external fixator removal and converting it into tibial nailing. The patient achieved a good functional outcome in terms of full weight bearing and walking after the procedure.

Keywords - Gustilo–Anderson, open tibia fracture, external fixator, Grade 3b tibia fracture.

Introduction

About more than 4.5 million open fractures occur per year in India. [1] Road traffic accidents, industrial accidents, and accidental falls contribute to the high incidence of open injuries. A total of 3, 66,138 road accidents have been reported in 2020, which claimed 1,31,714 lives and caused 3, 48,279 injuries in India.[2] Open fractures of the tibia are one of the most common compound fractures seen in orthopedic practice.[3] Due to its unique antinomy, vulnerable soft tissue envelope, and contamination of the wound the tibial open fracture is very difficult to manage. Complex open tibial fractures with vascular injuries might need limb amputation. The management approach for tibia open fracture has changed drastically from conservative to early surgical management.[4] The Gustilo–Anderson classification is the most used for open fractures of the tibia, it quantifies the degree of soft tissue injury in open fractures and examines their effect on the rate of infection. It includes Type I-III and Type III has three subsections A,B, and C, Type IIIB injuries are extensive soft tissue injuries with periosteal stripping and exposed bone.[5] (Table 1)

Table 1: Gustilo–Anderson classification of open wounds

Type	Wound	Contamination	Soft Tissue Injury	Bone Injury
I	< 1cm long	Clean	Minimal	Simple, Minimal Comminution

II	>1 cm long	Moderate	Moderate, Some muscle damage	Moderate Comminution
III A	Usually, >10 cm long	High	Sever with crushing	Usually comminuted: soft tissue coverage of bone possible
III B	Usually, >10 cm long	High	Very Severe loss of coverage; usually requires soft tissue reconstruction surgery	Bone coverage is poor, variable from moderate to severe comminuted
III C	Usually, >10 cm long	High	Very severe loss of coverage + vascular injury requiring repair; may require soft tissue reconstructive surgery	Bone coverage is poor; variable from moderate to severe comminuted

Case Report:

A 30-year-old male reported to the emergency department with complaints of open injury to the right lower leg post a road traffic accident one day before. He has persistent pain, bleeding, and is unable to bear weight on the affected limb. No history of head injury, bleeding from ear, nose and throat, or loss of consciousness during or post the trauma. Has no complaints of the contralateral limb.

On examination, multiple lacerations were seen on right lower limb with a prominent 15cm open lacerated wound seen on the proximal part of the right lower limb (Figure 1). Ankle range of movements (ROM) full and free. ROM at knee terminally restricted due to pain. The patient was unable to bear weight post the accident. Sensations and distal pulse of the left lower limb are intact. No Dynamic Non-linear Vibration Dissipaters (DNVD) were observed.

His Xray of right leg showed fracture of tibia with wedge fragment medial displacement in AP view and in lateral view it showed anterior displacement of the distal part of the tibial fracture. (Figure 2). We diagnosed it as Case of Type IIIB compound fracture with periosteal stripping.

Figure 1. Open wound with laceration in left lower limb.

Figure 2: Preoperative X-Ray showing fracture of Tibia.

Surgical management

The patient was planned for uniplanar unifocal external fixator initially for the first 4 weeks followed by external fixator removal and converting it into tibial nailing.

Broad-spectrum antibiotics were started intravenously. Emergency surgery was performed under general anesthesia. The patient was positioned in the supine position, and a tourniquet was used as needed. The wound was debrided bony chips were removed and then, washed with physiological saline. Open reduction was obtained after applying a uniplanar ex-fixator with 2 Schanz pins proximally and 2 distally with two parallel rods. Reduction checked under C-arm. Skin closed with loose stay sutures with no tension over suture line reduction maintained. After 5 days of observation Patient was discharged. Twice a week dressing was advised and done at home. Advised and checked CBC,ESR, CRP weekly.

Figure 3: Post-operative Xray after external fixation

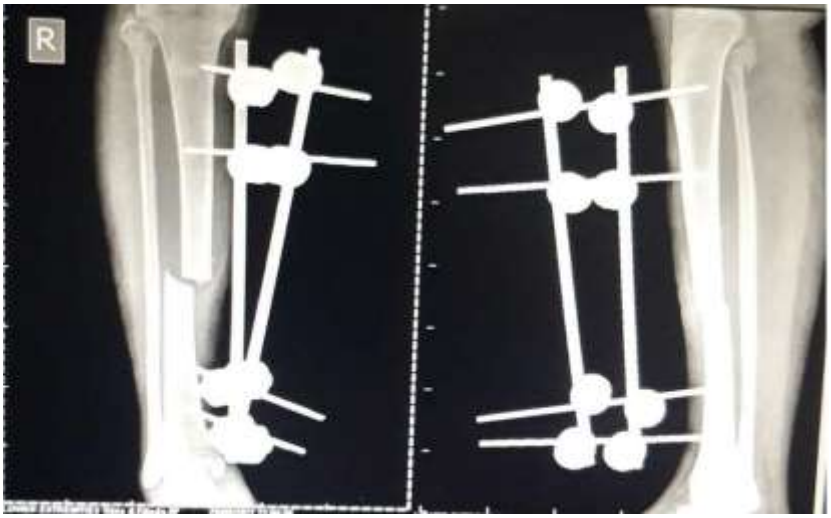

Figure 4: Post Operative image

After a period of 4 weeks when wound healing and normalization of blood parameters were achieved, patient was planned for intramedullary tibial nailing. External fixator was removed and keeping fracture ends in place a closed Intramedullary nailing for the tibia was done with 2 proximal and 2 distal bolts. Patient tolerated both procedures well.

Figure 5: Post-op x-ray after intramedullary nailing

Figure 6: Clinical image after nailing

Discussion

Open fractures are an important reason for mortality and morbidity among all musculoskeletal injuries. Compound fractures treatments have shown progression in recent years, but the treatment of Gustillo-Anderson, type 3 open fractures is always challenging and complicated due to high energy trauma, vasculoneural lesions, and vast soft tissue injuries resulting in treatment challenges and complications. A proper treatment plan for open fracture is vital, it includes accurately assessing the state of the fracture, assessment of the fracture, skin, muscles, nerves, and blood vessels as well as the degree of contamination. In cases of open fractures belonging to Gustillo-Anderson, type 3, the initial aim of treatment includes bleeding control, infection control, and temporary fracture fixation in cases of emergency. These treatments focus on limb and lifesaving procedures. In the surgical treatment of tibial compound fractures minimal osteosynthesis, biological fixation, and internal fixation with intramedullary nailing or external fixation with different types of fixators are used. [6,7]

The most preferred treatment option for a compound open fracture, like Gustilo-Anderson types 3B and 3C open fractures are the use of external fixators.[8] We have done a staged treatment option which will reduce the development of complications. In this case, the patient was managed by placing a unifocal external fixator as the primary treatment modality and the patient gained good functional outcome in terms of achieving dorsiflexion of the foot and knee flexion 4 weeks post-surgery. Post 4 weeks the patient was planned for intramedullary nailing of the tibia and the patient achieved good functional outcomes in terms of full weight bearing and walking after the procedure.

A similar staged treatment option was done in an earlier study, which followed up 16 patients with compound tibial fracture (12 of them with type 3 and four of them with type 2) at least one year after the two-staged treatment reported good results in 15 patients and bad results in one patient.[9]

Conclusion:

Open fractures in the tibia are the main cause of mortality and morbidity. Due to this, it needs to be treated promptly, initially by stabilizing the patient by putting external fixators followed by definitive management which includes Intramedullary nailing or plate osteosynthesis. The staged treatment option in type III open tibial fractures seems to be a good method for achieving the best results and reducing complications.

Conflict of Interest

The authors declare that there is no conflict of interest.

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