



LIMB RECONSTRUCTION SYSTEM AS A DEFINITIVE MODE OF MANAGEMENT FOR OPEN TIBIAL FRACTURES

Orthopaedics

Wajahat Ahmad Mir

Senior Resident, Postgraduate Department of Orthopaedics, SKIMS medical College, Bemina Srinagar

Mohmad Nawaz Rather

Senior Resident, Postgraduate Department of Orthopaedics, SKIMS medical College, Bemina Srinagar

Faisal Khursheed*

PG Scholar, Postgraduate Department of Orthopaedics, SKIMS medical College, Bemina Srinagar*Corresponding Author

ABSTRACT

Background: Subcutaneous nature of tibia makes it prone to open fractures. Early administration of intravenous antibiotics, together with early irrigation and debridement, greatly reduces the rate of infection. The usual protocol of wound debridement and application of fixator followed by intramedullary nailing is associated with prolonged hospital stay, multiple surgical procedures and increased financial burden on the patient. We evaluated the outcome of the Limb Reconstruction System as a definitive mode of management for open tibial fractures. **Material & Methods:** This prospective study was done from June 2018 to August 2022. Both sexes having age of 18 to 60 years with Gustilo Anderson type fractures IIIA or IIIB were included in this study. After seeking the institutional ethical committee approval, 28 patients were included in this study. Patients having open fractures with bone loss were excluded from the study. Clinical as well as radiological assessment at each follow up was done to check for any complications and signs of union. Final assessment was done by Association for the Study and Application of the Methods of Illizarov (ASAMI) criteria. **Results:** Out of 28 patients included, 24 (85.7%) were males and 4 (14.3%) were females. The mean age of patients was 37.4 years. Mean time to union was 5.6 months. The bone results from the ASAMI scoring system were excellent in 26 (92.8%) cases, fair in 1 (3.6%) case and poor in 1 (3.6%) case, whereas the functional results from the ASAMI scoring system were excellent in 26 (92.8%) cases, good in 1 (3.6%) case and poor in 1 (3.6%) case. **Conclusion:** Limb reconstruction system being a rigid osteosynthesis allows immediate weight bearing and range of movement as against AO external fixator. Moreover, the complications associated with internal fixation of open tibial fractures are also taken care of by using LRS. Hence LRS has a definite advantage over AO external fixator system as well as internal fixation in open tibial fractures.

KEYWORDS

Open fractures, Long bones, Limb reconstruction system

INTRODUCTION

Tibia due to its subcutaneous nature often presents with open fractures [1]. Local treatment is aimed at infection prevention, soft tissue coverage and fracture stabilization [2]. Early administration of intravenous antibiotics, combined with early irrigation and debridement, significantly decreases the rate of infection. Usual protocol for management of these fractures is thorough debridement coupled with temporary stabilization with fixator and closure of the wound allowing the wound to heal without any evidence of infection. Second procedure would be removal of fixator and insertion of intramedullary nail after pin tract healing [3]. The drawback of with this protocol is prolonged hospital stay, multiple surgical procedures and financial burden on the patient [2]. Limb reconstruction system (LRS) as definitive fixation mitigates the need for second surgical procedure, reduces the hospital stay as well as financial burden and allows early weight bearing due to its rigid stabilization of the fracture fragments.

AIM

The aim of this study was to evaluate the outcome of the Limb Reconstruction System as a definitive mode of management for open tibial fractures.

MATERIAL & METHODS

This prospective study was conducted in SKIMS medical college Srinagar India from June 2018 to August 2022. The inclusion criteria were both the sexes with 18 to 60 years of age. Gustilo Anderson type fractures IIIA & IIIB were included in this study. After seeking the institutional ethical committee clearance 28 patients meeting the inclusion criteria were included in this study. Patients having open fractures with bone loss were excluded from the study.

Patients were admitted, stabilized and evaluated. Patients were administered intravenous antibiotics and tetanus immunoglobulin within half an hour of presentation to the hospital. Preoperative radiographs of the affected limbs in orthogonal planes were taken. After thorough debridement, tourniquet was inflated followed by stabilization of the fracture with the application of LRS under spinal anesthesia. Wound was closed primarily in all cases. All the patients were asked to bear weight in the immediate post op period. Patients

were followed regularly and at each follow up, clinical as well as radiological assessment was done to check for any complications and signs of union. Final assessment was done by Association for the Study and Application of the Methods of Illizarov (ASAMI) criteria [4].

RESULTS

Our study included a total of 28 patients in which 24 (85.7%) were males and 4 (14.3%) were females. The mean age of patients in our study was 37.4 years. RTA as mode of trauma was present in 18 (64.3%) patients whereas simple fall was the mode of trauma in 10 (35.7%) patients. 12 (42.9%) patients had Gustilo Anderson type IIIA fracture whereas 16 (57.1%) patients had Gustilo Anderson type IIIB fracture.

The average hospital stay of our patients in this study was 3.7 days. Mean time to union was 5.6 months. We encountered refracture in 1(3.6%) patient which was subsequently managed by intramedullary nailing. Deep wound infection was seen in 1 (3.6%) patient which resolved with intravenous antibiotics & serial debridement. Pin tract infection was seen in 2 patients (7.2%) which was managed with pin site antibiotic washes. The bone results from the ASAMI scoring system were excellent in 26 (92.8%) cases, fair in 1 (3.6%) case and poor in 1 (3.6%) case, whereas the functional results from the ASAMI scoring system were excellent in 26 (92.8%) cases, good in 1 (3.6%) case and poor in 1 (3.6%) case.

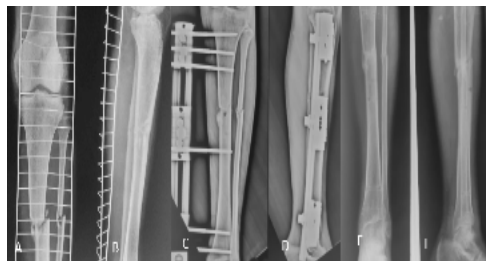


Figure 1: A & B showing pre-operative X rays AP & Lateral views, C & D showing immediate post-operative X rays AP & Lateral views, E & F showing union on AP & Lateral view X rays at 5 months follow up.

Table 1: Bone results according to ASAMI Scoring System

ASAMI Scoring	Bone results	Patients
Excellent	Union, no infection, deformity <7°, limb-length discrepancy <2.5 cm	26
Good	Union + any two of the following: absence of infection, deformity <7°, limb-length discrepancy of <2.5 cm	0
Fair	Union + only one of the following: absence of infection, deformity <7°, limb-length discrepancy of <2.5 cm	1
Poor	Non-union/re-fracture/union, infection, deformity >7°, limb-length discrepancy >2.5 cm	1

Table 2: Functional results according to ASAMI Scoring System

ASAMI Scoring	Functional results	Patients
Excellent	Active, no limp, minimum stiffness (loss of <15° knee extension/<15° ankle dorsiflexion), no reflex sympathetic dystrophy, insignificant pain	26
Good	Active with one or two of the following: Limp, stiffness, reflex sympathetic dystrophy, significant pain	1
Fair	Active with at least three of the following: Limp, stiffness, reflex sympathetic dystrophy, significant pain	0
Poor	Inactive (unemployment or inability to return to daily activities because of injury)	1
Failures	Amputation	0

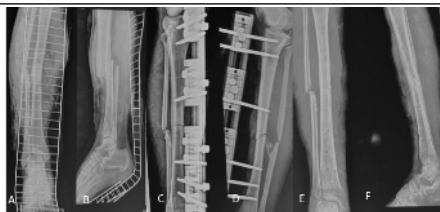


Figure 1: A & B showing pre-operative X rays AP & Lateral views, C & D showing immediate post-operative X rays AP & Lateral views, E & F showing union on AP & Lateral view X rays at 5 months follow up.

DISCUSSION

Open tibia fractures are quite common due to rise in high velocity motor vehicular accidents [2]. These fractures are a major challenge because of their associated complications like infection, bone loss, soft tissue damage and nonunion. Various modalities of treatment are available for the management of these fractures ranging from internal fixation with intramedullary nails to external fixators. Intramedullary nailing in such fractures has been associated with significantly higher rates of infection whereas the problem associated with the external fixators is prolonged immobilization and a need for definitive fixation [5,6]. LRS being rigid stabilization system obviates the need of second procedure as well as allows an early full weight bearing patient mobilization. Literature regarding use of LRS for limb lengthening, non-unions and deformity correction is widely available, but there is hardly any literature regarding use of LRS as definite fixation device for fresh open tibial fractures [7-10]. Thus we evaluated the outcome of Limb Reconstruction System as a definitive mode of management for open tibial fractures without any bone loss.

We observed 100% union rate in our patients however one patient suffered refracture after union. In our study excellent bony as well as functional results were seen in 92.8% of patients. No cases of malunion or limb length discrepancy were seen in our study. Results of our study were superior to that of studies done by Patil et al. [2], McKee et al. [11], Robert et al. [12], Ajmera et al. [13]. Reason behind the superiority of our results must be the exclusion of fractures with bone loss.

CONCLUSION

Limb reconstruction system being a rigid osteosynthesis gives the freedom of immediate weight bearing and range of movement as against AO external fixator. Moreover, the complications associated

with internal fixation of open tibial fractures are also taken care of by using LRS. Hence LRS has a definite advantage over AO external fixator system as well as internal fixation in open tibial fractures.

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