ORIGINAL RESEARCH

Functional outcome of the patients managed with the primary fixation using rail road system in compound fracture of tibia

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ABSTRACT

Background: To assess the functional outcome of the patients managed with the primary fixation using rail road system in compound fracture of tibia. **Material & methods:** The present study was undertaken for assessing the functional outcomes of rail road fixator as a primary mode of fixation in compound tibia fractures. Examination for any peripheral nerve injury was done. After the primary management, we prepared the patient for surgical intervention. All patients were taken for immediate surgical debridement with removal of all dead necrotic tissues, removing the free loose bone pieces, followed by stabilization of the fracture with application of LRS system, under spinal anesthesia under a tourniquet and image intensifier in the supine position. Postoperative follow-up was done. All the results were subjected to analysis by SPSS software. **Results:** Mean time of fracture union was 28.5 weeks. According to Modified Johner and Wruh's criteria, excellent results were seen in 90 percent of the patients while good results were seen in 10 percent of the patients. 10 percent of the patients showed fair results. Overall complications were seen in 2 patients. One patient showed pin tract infection and one patient showed surgical site infection. **Conclusion:** LRS is a simple and easy system which can be used for all open fractures. Fixation with LRS is a single definitive surgery.

Key words: Tibia, Rail road system

INTRODUCTION

The tibia is one of two bones that comprise the leg. As the most of the weight-bearing, it is significantly larger and stronger than its counterpart, the fibula. The proximal portion of the tibia consists of a medial and lateral condyle, which combine to form the inferior portion of the knee joint.Tibial fractures are prone to complications.[1- 3] When deciding on the treatment strategy, the treating surgeon must consider the patient's condition, the mechanism of injury, and the fracture type. Although some of the most impressive injury patterns are from high-energy mechanisms, more commonly, patients present with an open fracture from a simple low-energy mechanism such as a fall.There are several procedures of surgery depending upon the type of fractures such as plating, nailing, bone grafting, external fixation, ring fixation etc.Every method has got its own merits and demerits. One of the most reliable techniques is application of ring fixators eg. Illizarov but it has some disadvantages followed by dissatisfaction with patients. It causes various complications such as persistent pain, discomfort and heaviness. In many studies it is seen that the Limb reconstruction surgery (LRS) through Monorail system is superior to ring fixator.[5- 7]Hence; the present study was conducted for assessing the functional outcome of the patients managed with the primary fixation using rail road system in compound fracture of tibia.

MATERIALS & METHODS

The present study was undertaken for assessing the functional outcomes of rail road fixator as a primary mode of fixation in compound tibia fractures. Examination for any peripheral nerve injury was done. After achieving all the protocols, wound debridement was done and suture was applied if necessary. All patients were given Tetanus toxoid and prophylactic antibiotics.The instruments were cleaned properly by alcohol diluted in water with the

minimum strength of 70%.After the primary management, we prepared the patient for surgical intervention. All patients were taken for immediate surgical debridement with removal of all dead necrotic tissues, removing the free loose bone pieces, followed by stabilization of the fracture with application of LRS system, under spinal anesthesia under a tourniquet and image intensifier in the supine position. Postoperative follow-up was done. All the results were subjected to analysis by SPSS software.

RESULTS

A total of 20 patients were enrolled. Mean age of the patients was 42.8 years.90 percent of the patients were males while the remaining 6.67 percent were females.Mean duration of surgery was 52.17 minutes. Secondary procedures (Grafting) were done in 40 percent of the patients. Time of full weight bearing was 6.8 days.Mean time of fracture union was 28.5 weeks.According to Modified Johner and Wruh's criteria, excellent results were seen in 90 percent of the patients while good results were seen in 10 percent of the patients. 10 percent of the patients showed fair results. Overall complications were seen in 2 patients. One patient showed pin tract infection and one patient showed surgical site infection.

Table 1: Duration of surgery

Parameter	Mean	SD
Duration of surgery (minutes)	56.8	13.2

Table 2: Outcome according to Modified Johner and Wruh's criteria

Outcome according to Modified Johner and Wruh's criteria	Number	Percentage
Excellent	18	90
Good	1	5
Fair	1	5
Poor	0	0
Total	20	100

DISCUSSION

Incidence of fractures of long bones is increasing day by day due to increased road traffic accidents and other domestic accidents. The shaft of the tibia is one of the most common sites of an open fracture as one third of its surface is subcutaneous. Open fractures of the tibia are associated massive soft tissue injury and bone loss with high rates of infection and nonunion resulting in poor treatment outcome. The treatment goals include prevention of infection, soft tissue coverage and fracture stabilization leading to union with simultaneous mobilisation of nearby joints enabling early return to function. The specific method of skeletal fixation and soft tissue management in open fractures continues to be a topic of debate in orthopaedic traumatology with the treatment options ranging from external fixators, Ilizarov fixators, nailing, plating, tibial synostosis, free or vascularized bone grafting along with allografts or bone substitutes, all having their own set of complications. Treatment protocol of compound fractures involves thorough initial debridement and external fixation followed by closure of the wound either by flap rotation or skin grafting. Then intramedullary interlocking nailing or plating with or without bone grafting is done as a secondary procedure.[6- 10]

A total of 20 patients were enrolled. Mean age of the patients was 42.8 years. 90 percent of the patients were males while the remaining 6.67 percent were females. Mean duration of surgery was 52.17 minutes. Secondary procedures (Grafting) were done in 40 percent of the patients. Time of full weight bearing was 6.8 days.Mean time of fracture union was 28.5 weeks. Anand VK et al assessed the union rates, infection control and complications associated with LRS. 42 patients with complex nonunion of long bones managed with application of rail fixators were enrolled. Fixation was performed using a monolateral external fixator. Corticotomy was done in almost half (55%) of the patients. Two patients required additional bone grafting and one patient required freshening of bone ends as secondary procedures. Another secondary procedure adopted was PRPP injection in 1 patient at the docking site to achieve union but it ultimately failed to unite. Out of 42 patients, 22 patients are while remaining 18 patients are still undergoing treatment and one patient lost to follow up. Mean treatment duration was 7.9 months ranging from 4 months to 14 months. Complex nonunion can be managed satisfactorily with rail fixators.[10]

In the present study, according to Modified Johner and Wruh's criteria, excellent results were seen in 90 percent of the patients while good results were seen in 10 percent of the patients. 10 percent of the patients showed fair results. Overall complications were seen in 2 patients. One patient showed pin tract infection and one patient showed surgical site infection.Singh AK et al studied the Functional outcome of performing distraction osteogenesis in cases of infected non-union of tibia treated with Ilizarov and Limb Reconstruction System. The study was done with 27 patients of infected gap nonunions of the tibia. The ASAMI-Bone healing score was Excellent or Good in 86% patients, and Functional score was Excellent or Good in 89% of patients. The commonest

problems were of pin tract infection, wire loosening and angulation of the transported segment. Elderly age, persistent infection, sensory loss in the foot, the stiffness of the knee, and above all the patient's reluctance to go any further given the protracted treatment besides, systemic disorders such as diabetes are all pointers for considering amputation as an alternative.[11]Singh P et al analysed the efficacy, functional and radiological outcome of Limb Reconstruction System (LRS) in management of open fractures of tibia with or without bone loss as a primary and definitive tool. They treated 20 patients with compound injuries of tibia with Limb Reconstruction System (LRS) as a primary and definitive tool. 15 males & 05 females were included. Average follow up period was 36.45±4.7 weeks ranging from 06 – 18 months. There was sound bony union in all of the cases with resolution of infection. The mean time of full weight bearing was 10.45±2.25 weeks and bone union time was 23.26±6.33 weeks. ASAMI score (Association for the Study and Application of the Method of Ilizarov) for bony outcome was Excellent in 13 (65%) patients, Good in 5 (25%) patients, Fair in 1 (5%) patient and Poor in 1 (5%) patient. ASAMI score for functional outcome was Excellent in 14 (70%) patients, Good in 4 (20%) patients, Fair in 1 (5%) patient and Poor in 1 (5%) patient. Rail external fixator was sufficient enough for wound healing & bony union. Limb Reconstruction System (LRS) offers an alternative option to treat compound fractures of tibia because of simplicity of application, its good fracture stability, adjustable geometry, light weight, affordable cost, patient friendly and can induce/enhance fracture healing by compression and distraction osteogenesis.[12]

CONCLUSION

LRS is a simple and easy system which can be used for all open fractures. Fixation with LRS is a single definitive surgery.

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