

Original Research Paper

Evaluation of ilizarov in infected non-union of long bones

B.S. Brar Professor; **HKS Chawla** Assistant Professor; **Ashish Garg** Senior Resident; **Nishant Pawar** Junior Resident
Department of Orthopaedics, Govt. Medical College Patiala.

Corresponding Author

Nishant Pawar, # Flat No.8 SG Apartments, Good Earth Colony, Patiala
Email: docnishantpawar@gmail.com Mob: +91 7696185647

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Abstract:

Infected non-union is a common concern with fractures. Co-existing problems of bone loss, deformities, limb length inequality usually exist. Despite the advancement in treatment methods, infected non-union still remains a challenge for the surgeon as well as the patient. The aim of this study is to evaluate the efficacy of Ilizarov ring fixator in the management of infected non-union of long bones.

Method:

A group of 30 patients with mean age 36.26 years (18-60) were included in the study. All patients were managed with the described ring fixator.

Result:

Average shortening was 2.95 cm. Resolution of infection and bony union occurred in all the cases. Mean duration of treatment was 13.7 months. Bone results were found to be excellent in 16 out of 30 patients (53.33%), good in 8 patients (26.66%) and fair in 4 patients (13.33%). Poor results were found in two patients.

Conclusion:

The study concluded that this method is an effective treatment for the management of infected non-union.

Key Words:

Limb Lengthening, Osteomyelitis, Bone Loss, Non Union, Infection.

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Introduction

Incidence of fractures of long bones is on the rise due to ever increasing road traffic accidents and domestic accidents such as falls, leading to compound fractures, compartment syndrome, neuro-vascular insult, infections and non-union. Infected non-unions are challenging for the surgeon due to challenging functional restoration and resolution of the infection as it is usually chronic and resistant to treatment. The involved bones are deformed, shortened and osteoporotic. Joint stiffness and muscle atrophy are common due to disuse. A significant controversy exists in the treatment of non-union regarding the use of various methods. A multi-disciplinary approach is usually required, consisting of debridement, temporary and definitive stabilization, correction of deformity and shortening and rehabilitation. Various devices are used in treatment of non-union such as external fixator, antibiotic coated intramedullary nails, railroad fixator etc. The ilizarov fixator is a novel device which allows simultaneous stabilization, deformity correction and management of limb length inequality when applied correctly¹. In this study we evaluate the efficacy of such fixator for the treatment of infected non union with bony and functional outcomes into consideration.

Method

30 patients with infective non-union of fracture of long bones were treated using Ilizarov technique. Thorough evaluation of history, mode of trauma, comorbidities and previous surgeries was performed and documented. Pre-operative investigations included x-ray of the limb, routine investigations, culture, measurement of deformity and shortening. The ring fixator was applied under anesthesia after thorough debridement and wound lavage. The ends of bones were debrided till paprika sign² was noted, made congruent and compression was given at the time of surgery. 8 patients needed only compression while in 22 patients, corticotomy was performed. Following a latency period of 7-10 days³, distraction was begun in 22 patients. Patients were mobilized and active physiotherapy was encouraged. Antibiotics were administered as per the infection protocol and serial cultures were performed. Limb lengthening was followed by consolidation phase after which fixator was removed and the limb was braced accordingly. The bony and functional outcomes were evaluated as per ASAMI criteria.⁴

Results

Patients ranged from 18-60 years of age with average age was 36.26 years and Male:Female sex ratio 9:1. 27 patients (90%) suffered from road traffic injury while 3 patients had a fall from height. Tibia was involved in 27 (90%) of 30 patients while 3 patients suffered from infected non-union of femur. 24 out of 30 patients (80%) had involvement of the right limb. In 13 out of 30 patients (43.33%), infected non-union was

found in middle 1/3 of bone. 10 (33.33%) patients had an involvement of proximal 1/3 while 7 (23.33%) patients had involvement of distal 1/3 of bone. Average duration of treatment was 13.7 months. 22 out of 30 (73.33%) patients had more than 12 months of treatment while 8 patients had less than 12 months of treatment duration. 2 patients out of 30 required POP cast after removal of the fixator apparatus. 4 patients had wire loosening, 3 patients had pin tract infection, 3 had pin breakage and 2 patients required an additional ring insertion. Average lengthening achieved was 2.13 cm. One patient had 5 cm of shortening. None of the patients required amputation due to treatment failure or neurovascular compromise.

Bone Results

Grade	Criteria	No. of Patients
Excellent	Union, no infection, Deformity < 7 deg, Limb length discrepancy < 2.5 cm	16
Good	Union + any two of the following; absence of infection, < 7 deg deformity and limb length discrepancy of, 2.5 cm	8
Fair	Union + one of the following; Absence of infection, < 7 deg deformity and limb length discrepancy of, 2.5 cm	4
Poor	Non union/refracture/union + infection + deformity . 7 deg + limb length discrepancy . 2.5 cm	2

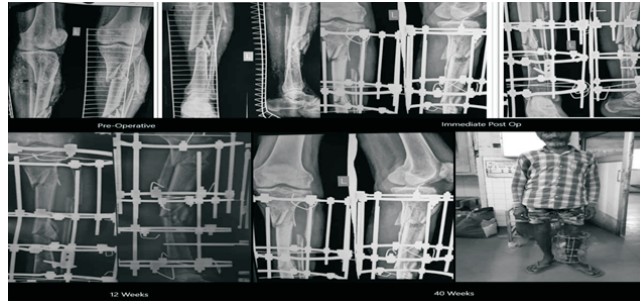
Functional Results

Grade	Criteria	No. of Patients
Excellent	Active, no limp, minimum stiffness [Loss < 15 deg knee extension/, 15 degrees dorsiflexion of ankle], No reflex sympathetic dystrophy [RSD], insignificant pain	20
Good	Active with one or two of the following: limp, stiffness, RSD, significant pain	6
Fair	Active with three or all of the Following; limp, stiffness, RSD, significant pain	2
Poor	Inactive [Unemployment or inability to return to daily activities due to injury]	2
Failure	Amputation	0

Discussion

Infected non-union is a significant problem in the management of fractures owing to various factors such as duration of treatment, loss of function, technically challenging and prolonged treatment. It also affects the patients from psychosocial, functional and socio-economic aspects. The patients in the study had undergone multiple procedures at the initial stages at various places before being included in the study group. These operative procedures ranged from external fixator in compound fractures to open reduction and internal fixation and bone grafting later. Application of ilizarov fixator was beneficial for the outcome of these patients.

The principle of the treatment is based on distraction osteogenesis⁵, a procedure where controlled gradual displacement of fracture leads to expression of new bone and soft tissue. Following corticotomy and a period of latency, the fracture fragments are gradually pulled apart under observations and as per the guidelines using the fixator assembly which results in correction of the limb length inequality. Fracture debridement and stabilization using the fixator leads to correction of deformity alongwith treatment of the infection owing to the stability and debridement of the limb. The fixator is modular; therefore, any part of the device may be replaced, altered or revised if needed. Biomechanically, the circular nature of fixator provides stability as well as micromotion at the fracture site necessary for the union of bone. Early mobilization and physiotherapy prevents development of stiffness and contractures⁶. Drawbacks of such treatment include bulky apparatus, duration of treatment, requirement of surgeon precision and technical knowledge. Patient compliance is a significant factor for the success of this treatment.



The treatment process with the Ilizarov fixator is technically challenging, time consuming and demanding both for the surgeon and the patient. However the results are excellent if the treatment principles are followed. We conclude that it is an effective method for the treatment of infected non-union.

Conflict of Interest: None

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