

## ORIGINAL ARTICLE

## Outcome of infected non union tibia managed with illizarvo

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**Received:**  
3rd May, 2018

**Accepted:**  
17th January, 2019

### Abstract

**Objective:** To determine the functional outcome of patients presented with infected non-union and were managed with excision of dead bone and primary compression using IL-LIZARVO technique.

**Study design:** Prospective study

**Place and duration of study:** It was done at Department of Orthopedics, Bolan Medical College from 1<sup>st</sup> January 2015 to 31<sup>st</sup> December 2017

**Material and Methods:** A total of 74-patients of age between 15-45 years and either gender were included in the study who fulfilled the inclusion criteria. The data collected included demographic data, complications during treatment and union rate. All the patients were regularly followed and data were analyzed using SPSS version 17.

**Results:** There were 41(55.41 %) having excellent, 23(31.08%) having good, 9(12.16%) having fair and 1( 1.35 %) having poor results according ASAMI criteria. 12(16.22%) having pin site infection, 8( 10.81%) having breakage of wires, 5(6.76%) having non union and 3(4.05%) having deep infection.

**Conclusion:** The patients with infected non union of tibia can be easily managed with magic illizarvo technique through just excision of dead bone and primary compression without doing proximal corticotomy for healing. This with decrease the surgery time as well as trauma to the patient.

**Keywords:** Illizarvo, infected, non-union tibia, excision of dead bone, primary compression

### Introduction:

Injury is one of the leading cause of morbidity and disability.<sup>1</sup> The epidemiology of tibial shaft fractures varies from one country to another.<sup>2</sup> Non-unions of long bone fractures represent a clinical entity that is commonly perpetuated by a high velocity injury. There are both bony and soft tissue factors responsible for the non-union.<sup>3</sup> Infected non-union is challenging orthopaedic complications to manage. There is considerable morbidity associated with infected non-union one of the most.<sup>4</sup> Although definitions vary, infected non-union has been defined as a state of failure of union and persistence of infection at the fracture site for 6 to 8 months.<sup>5</sup> Infected non-union of a long bone continues to present difficulties in management. In addition

to treating the infection, it is necessary to establish bony stability, encourage fracture union and reconstruct the soft-tissue envelope.<sup>6</sup> The prevalence of non-union in closed tibial fractures is 2.5%, and it increases five to seven fold for open fractures with gross contamination and extensive soft-tissue damage due to infection.<sup>7</sup>

The Ilizarov technique has been used in the UK for the last 20 years in the management of infected non-union of long bones. This method uses fine wires inserted percutaneously which are attached and tensioned to provide a strong frame construct. The majority of tibial and femoral non-unions can be treated successfully by internal fixation<sup>8</sup> Ilizarov external fixator is a successful method in the acute management of

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Table-1: Demographic Characteristics and surgical outcome of patients

Variables		Frequency(n)	Percentage(%)
Sex	Male	55	74.32%
	Female	19	25.68%
Side of Tibia Non union	Right	57	60.36%
	Left	17	30.64%
	Both	Nil	0%
Mechanism of Injury	Road traffic injury	61	66.67%
	Fall	8	28.83%
	Others	6	4.50%
Co morbidities;	Nil	41	29.72%
	Diabetes	15	24.32%
	Hypertension	8	9.91%
	Ischemic heart disease	4	7.21%
	Others	6	28.83%
Complications	Pin site infection	12	16.22%
	Breakage of wire	8	10.81%
	Non union	5	6.76%
	Deep infection	3	4.05%
	Knee stiffness	3	4.05%

Table-2: Outcome of surgery using ASAMI Scoring

ASAMI Criteria	Frequency (n)	Percentage (%)
Excellent	41	55.41
Good	23	31.08
Fair	9	12.16
Poor	1	1.35

segmental tibial fractures,<sup>9</sup> managing a massive segmental skeletal defect<sup>10</sup> medial fibular transfer using Ilizarov external fixators in management of patients with large tibial defect, either following infection or trauma.<sup>11</sup> Its main drawback is the long duration of external fixation (EF) with marked patient discomfort.<sup>12</sup>

The problems in infected non-union include multiple sinuses, osteomyelitis, bone and soft tissue loss, osteopenia, adjacent joint stiffness, complex deformities, limb-length inequalities, and multidrug-resistant poly-bacterial infection.<sup>13</sup>

The main aim of this study was to determine the complications rate associated with this technique and union rate in patients suffering from infected non union of tibia in our area.

## Materials and Methods:

This study was carried out at Department of Orthopedics Bolan Medical College and Hospital, from 1<sup>st</sup> Jan 2015 to 31<sup>st</sup> December 2017 after approval from the hospital ethical committee. A total 74 patients of either gender and aged between 15-45 years were included in the study after fulfilling the inclusion criteria. The purpose and procedures of the study were explained to all participants by a trained researcher and written informed consent was obtained from all subjects. The patients who had infected non-union of tibia with any mechanism of injury, presented after 6-months of injury and managed initially by any way, were included in the study. While the patients who were less than 15-years, older than 45-years, more than 1 co-morbidity, having radiation exposure, neoplastic changes, need of flap or grafting and need of lengthening were excluded from the study. All the patients were operated by same group of surgeons under spinal anesthesia. The necrotic tissue were removed and primary compression done without proximal corticotomy. 4-Rings were applied, 1 proximal, 1 distal and 2 near primary compression site. The patients were mobilized full weight bearing on 1<sup>st</sup> post-operative day and were discharged on 4<sup>th</sup> post-operative day after counseling about care of pin sites. The patients were followed on 2<sup>nd</sup> and 6<sup>th</sup> week and then regularly monthly. Radiography were done in each visit. Data included demographic data, time of union as well as complications. Variables include patient demographic profile, ASAMI Scoring and complications. Data were entered in SPSS version 17. Frequency and percentages were calculated for categorical variables. Mean and SD were calculated for numerical data.

## Results:

Among 74 patients ,there were 55(74.32%) males and 19(25.68%) with male to female ration of 2.89:1. The age ranged from 15 to 45 years. The mean age was 27.2±5.7 years. 57(60.36%) patients having right tibia involvement, 17(30.64%) having left tibia involvement while none of the patient having bilateral in-

volvement. Road traffic injury was mechanism of injury in 61(66.76%), fall in 8(28.83%) and others in 6(4.50%). 41(29.72%) having no co-morbidity, diabetes in 15(24.32%), hypertension in 8(9.91%), Ischemic heart disease 4(7.21%). All demographic variables along with complications are summarized in table 1.

According to ASAMI criteria, 41(55.41%), good 23( 31.08% ), fair in 9(12.16 % ) and poor in 1( 1.35%) as summarized in table 2.

### Discussion:

Infected non-unions of tibia pose many challenges to the treating surgeon and the patient. Challenges include re-calcitrant infection, complex deformities, sclerotic bone ends, large bone gaps, shortening, and joint stiffness<sup>14</sup> Ilizarov fixator is an external fixation device used in orthopedic surgical procedure to lengthen or correct the angular deformities in limb bones, to treat compound or open bone fractures and infected non-union fractures.<sup>15</sup>

In our study, there were 41(55.41%) having excellent, 23(31.08%) having good, 9(12.16%) having fair and 1(1.35%) having poor results according ASAMI criteria. 12(16.22%) having pin site infection, 8(10.81%) having breakage of wires, 5(6.76%) having non-union, 3(4.05%) having deep infection and no patient having major neurovascular complication or required amputation while Pande et al did a retrospective study on 18 patients and found that only one limb required amputation and mean time to union was 211.83 days (range 136 - 320 days/ median 184) or 7.01 months and ASAMI score, Bone results were excellent in 10, good in 5, fair in 2 and poor in 1. Functionally 7 were graded as excellent, 6 as good, 3 as fair and 1 as poor.<sup>16</sup> While Ali et al did a study on 90 patients, who were treated with Ilizarov and fixator was applied for an average of  $17.9 \pm 10.3$  SD weeks with a range of 7-48 weeks. Outcome graded as per ASAMI criteria as excellent in 60 (66.6%), good in 21 (23.33%), fair in 6 (6.66%) and poor in 3 (3.33%) patients. The main complications in 29 (32.2%) cases were infection, of which 4(4.44%) were major infections and 25 (27.7%) were mi-

nor pin tract infections. Joint stiffness was found in 12(13.3%) patients and limb shortening in 5(5.5%) patients of more than 2.5 cm.<sup>17</sup>

Hosny et al did proximal corticotomy along with illizarvo application and found the union was successfully achieved in 141 cases (97.92%) while non-union persisted in three cases (2.08%) in the distal tibia.<sup>18</sup>

Similarly Sakali et al found that bone results were excellent in 9, good in 5, fair in 2, and no poor according to ASAMI Scoring. Functional results were excellent in 9, good in 5, fair in 2, and no poor. The most common complication was pin site infection. Out of 16 patients, 10 had Grade II, 4 had Grade III, and 2 had Grade IV infection which was managed accordingly. There were no major complications or neurovascular complications.<sup>7</sup> Another study by R SK found that the ASAMI (Association for the study and application of the methods of Ilizarov) scoring system we obtained 10 excellent, 8 good, 2 fair, 1 poor functional results.<sup>19</sup> All these study found that the illizarvo method of treating non union tibia is excellent option with good functional outcome.

There were several limitations of our study. The follow up was of low period, few cases were missing which were excluded from study due to loss in follow up. Moreover we didn't perform proximal corticotomy for healing and comparing it with managing those cases in whom , we didn't perform proximal corticotomy.

### Conclusion:

Infected Non-union of tibia can be easily managed with illizarvo without any significant morbidity. It take the lead in managing such patients who presented after several failed surgeries. It should always be considered as first choice while managing such patients in countries like Pakistan.

**Conflict of interest:** None

**Funding source:** None

**Role and contribution of authors:**

Dr Attiq ur Rehman, conceived the idea and did the initial write up.

Dr Karim Baksh, collected the data, references and helped in introduction writing.

Dr Mohammad Buksh, critically review the article and made final changes

Dr Abdul Hameed, collected the data and references and helped in discussion writing.

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