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Original Article

Post-operative complications of ilizarov technique in tibial non-union- A prospective study

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Abstract

Background: Non-union of the tibia is a significant problem for patient and surgeon, and in many situations the patient has undergone more than one surgical procedure, and lost considerable time from his job and his life. Ilizarov technique is an effective method for treatment of tibial non-union. It has low rate of complication.

Objective: To assess the post-operative complications of Ilizarov technique in tibial non-union. Methodology: This prospective study was carried out at the Department of Orthopedic Surgery at Chittagong Medical College Hospital, Chittagong from June 25, 2018 to June 24, 2019. All the data were compiled and sorted properly and the quantitative data was analyzed statistically by using Statistical Package for Social Science.

Result: out of 12 cases, 8 (66.7%) were in <30 years age group. Mean (±SD) age was 27.58±5.62 years. Eleven cases (91.7%) in the study were male and only 1 case (8.3%) was female. Operation was performed in most of the cases (41.7%) in less than 2 hours and in 25% of them it was more than 3 hours. 91% had corticotomy during operation. No major neuro-vascular structures injury was observed during surgery. In majority of the cases (n=8) external fixator held for a time period of 7-8 months. In 2 cases fixator was held for 6 months and in other 2 cases it was held for 10 months. Most common complication was pin site infection observed in 66.7% patients followed by wire breakage (16.7%) and persistent infection (8.3%). 25% patients developed no complication.

Conclusion: Awareness of predictable complications is beneficial to prevent or early detection of the expected complication which can improve the risk-benefit balance.

Keywords: Post-operative complications, Ilizarov technique, Tibial non-union

Introduction

Tibial shaft fractures are common but unanticipated trauma in adults resulting in painful and prolonged recovery, often associated with complications. The U.S. National Center for Health Statistics reported annual incidence of 492,000 fractures of tibia, fibula, and ankle.[1] Tibia and fibula fractures annually result in 77,000 hospitalizations accounting for 569,000 hospital days and 825,000 physician office visits.[2] Tibia fractures are treated medically, and healthcare use depends on treatment options, which, in turn, vary by injury type and severity and the presence of complications.[3] Fracture nonunion (sometimes referred to as "delayed union") is a common complication of a tibia fracture; it indicates that fracture healing is not happening in a timely fashion.[4] Non-unions put additional burden on the patient because they prolong the disability and are associated with substantial pain.[5] There is no standard definition of nonunion, and some authors have defined tibia nonunion as a fracture that has not united without additional surgical or nonsurgical intervention within 6–9 months4, whereas others waited for six month to perform surgeries to correct non-unions.[6] Application

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of the techniques of Ilizarov provides ability to correct deformities, eliminate prolonged pre and postoperative intravenous antibiotic therapy, regenerate new bone tissue without the use of bone grafts, progressively lengthen the extremity, and allow weight bearing during the treatment period.[7] Ilizarov method addresses many problems simultaneously and offers a panacea for infected non-unions. The stability of the fixation and provision for bone transport allows bridging of bone defects, limb lengthening, early weight bearing ambulation and joint mobilization.[8]

Materials & Methods

This Prospective Interventional Study study was carried out among 12 patients attending at the Department of Orthopaedic Surgery at Chittagong Medical College Hospital, Chittagong for the treatment of tibial non-union within the defined period from June 25, 2018 to June 24, 2019. Ethical clearance was obtained from the Institutional Review Board (IRB) of CMCH. Purposive sampling was done according to availability of the patients. The collected data were entered into the computer and analyzed by using SPSS (version 20.1) to assess the Post-operative complications of ilizarov technique in tibial non-union.

Results

In the present study, out of 12 cases, 8 (66.7%) were in <30 years age group. Mean (±SD) age was 27.58±5.62 years. Eleven cases (91.7%) in the study were male and only 1 case (8.3%) was female (Table-I).

Table-I: Age and sex distribution of the respondents. (n=12)

Age (years)	Number	percentage
<30 years	08	66.7%
≥ 30 years	04	33.3%
Sex		
Male	11	91.7%
Female	01	8.3%

* Mean (±SD) age was 27.58±5.62 years. Age range was 18-38 years

Operation was performed in most of the cases (41.7%) in less than 2 hours and in 25% of them it was more than 3 hours. 91% had corticotomy during operation. No major neuro-vascular structures injury was observed during surgery (Table-II).

Table-II: Operative variables of the responding patients. (n=12)

Attributes	Number	percentage
Duration of operation		
< 2hours	05	41.7%
2-3 hours	04	33.3%
>3hours	03	25.0%
Injury to the major neuro-vascular structure	0	0%
Corticotomy	11	91.7%
Refashioning of fracture site	09	75.0%

Average duration of application of Ilizarov ring fixator in months was 7.67 (±1.30). In majority of the cases (n=8) external fixator held for a time period of 7-8 months. In 2 cases fixator was held for 6 months and in other 2 cases it was held for 10 months (Table-III).

Table-III: Duration of Ilizarov ring fixator application on responding patients (n=12)

Duration of Ilizarov ring fixator application	Number	percentage
6 month	02	16.66 %
7 month	04	33.337 %
8 month	04	33.33%
10 month	02	16.66%

Most common complication was pin site infection observed in 66.7% patients followed by wire breakage (16.7%) and persistent infection (8.3%). 25% patients developed no complication. (Table-IV).

Table-IV: Post-operative complication among the respondents (n=12)

Post operative complication	Number	percentage
No complication	03	25 %
Pin site infection	08	66.7 %
Wire breakage	02	16.7%
Persistant infection	01	8.3%

• One patient may develop two or three complications

Discussion

In the present study, mean (±SD) age of the 12 patients was 27.58±5.62 years with a range of 18-38 years. Average age of the patients in the study of Madhusudhan et al. (2008) was 37.2 years with a range of 20 to 52 years.[9] Out of 12 patients, 11 were male and 1 was female, may be due to more outdoor activities of the males and hence making them more prone to trauma.

This demographic characteristic were in agreement with Reddy et al. 2018; Sakale et al. 2018; Haque et al. 2013; Bansal et al. 2014 studies carried out in and around our Bangladesh.[10-12,8] Average duration of application of Ilizarov ring fixator in months was 7.67, whereas Bansal et al.[8] reported average of 5.51 months. In majority of the cases, external fixator held for a time period of 7-8 months which is comparable to Meleppuram et al. 2017; Sen et al. 2006 studies.[13, 14] The most common complication was pin-track infection, and the incidence was 66.7%. Other complications in the present study were wire breakage, wire, nut and bolt breakage and persistent infection. In the present study, during discharge from the hospital, patients and attendants were being advised about proper pin site care. Nevertheless, very few patients strictly adhered to the instructions. Out of 12 patients 8 patients develop pin site infection. In an earlier study the authors reported that, despite being advised about proper pin site care, all of the patients developed pin site infection.[9] From a prospective study of Bangladesh to assess the results of Ilizarov technique for nonunion of the tibia among 30 cases, author concluded that, this technique was the demanding treatment of infected non-union of tibia and nonunion of tibia with leg length discrepancy. Pin site infection and pain were the commonest complications in Haque et al. study.[12]

Conclusion

Ilizarov technique is an effective method for treatment of tibial non-union. Treatment time with Ilizarov is lengthy with a considerable risk of complications. Awareness of predictable complications is beneficial to prevent or early detection of the expected complication which can improve the risk-benefit balance.

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Conflict of Interest: None.

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