

The Complication of Tibial Fractures with Ilizarov External Fixation: A longitudinal study

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Abstract

Aim: The purpose of this study was to assess if the Ilizarov ring fixator caused any problems in open tibial fractures.

Study design: A longitudinal study

Place and Duration: This study was conducted at Muhammad Medical College and Hospital Mirpurkhas, Pakistan from January 2020 to January 2021.

Methodology: For this study, 55 adults were included. Clinical evaluations were performed on the patients based on their medical histories and physical examinations. Acute open grade III tibia fractures with >5cms of bone loss and infected non-union with or without prior history of internal fixation were included in this study. Plain anteroposterior and true lateral radiographs were utilized to evaluate the affected limb to measure the complications.

Results: Out of the 55 cases, 48 were male, and seven were female. In 47 of the 55 instances, the right tibia was implicated. In 92% of cases, there was a history of a car collision on the side of the road, and 7% of cases had a history of a fall from height. The limp was observable in 38 cases (45%), ankle stiffness in 12 cases (28.34%), pin site infection in 21 cases (38%), limb oedema in 14 cases (28.09%), loosening of pins in 1 case (3.3%), knee stiffness in 6 cases (15%), deformity (>7 degrees) in 4 cases (3.4%), and refracture in three cases (4.4 %).

Conclusion: The most common consequences were limb and pin tract infection. The majority of problems can be avoided with proper post-operative care. Complications can be adequately handled if detected early.

Keywords: Fracture, Ilizarov technique, infection, tibia.

Introduction: -

Tibial plateau fractures are difficult to cure surgically. Articular depression, condylar comminution, diaphyseal involvement, soft tissue and ligament injuries, related neurovascular injury, and compartment syndrome are all issues to be aware of. (1)

Associated disorders such as chronic infection, soft tissue and bone loss, the discrepancy of limb length, and deformity might exacerbate non-union of a fracture. (2) Orthopaedics surgeons have long been frustrated by infected tibial non-union. (3) To be successful, articular cartilage must be restored, anatomy must be preserved, the mechanical axis must be aligned, joint stability must be restored, and functional mobility must be maintained. (4)

The theory of tension stress describes how bone and soft tissue regeneration occurs under tensile forces in Ilizarov's treatment procedure. When treating a non-union or a bone defect, the Ilizarov fixator offers the advantage of reducing the risk of angular or rotational abnormalities and allowing for easy correction in the event of a deformity. (5) Although most investigations on tibial bone abnormalities treated with Ilizarov procedures have yielded excellent results, there have been a few reports that have yielded less-than-ideal results. (6, 7) This device offers excellent stability and allows for early weight-bearing. The downsides are that it is inconvenient, difficult to dress wounds, necessitates knowledge, and is a costly instrument. (8) The limited anatomic pathways in which fine wires in the diaphysis can be positioned to minimise neurovascular damage is their primary limitation. (9) These wires irritate tendons and transfix muscle, causing pain, loss of movement, and perhaps increasing the risk of pin site infection and joint contracture in the area. Wires are more difficult to remove and inconvenient. Another disadvantage is the frame's intricacy and design. These concerns, as well as the time it takes to fix the problem and the risk of consequences, are reduced when the number of wires is reduced. (10)

This study aimed to assess the role of Ilizarov fixation in the treatment of infected tibial non-union and the complications and functional outcomes.

Methodology

The purpose of this longitudinal study was to assess if the Ilizarov ring fixator caused any problems in open tibial fractures. The study investigated 55 adult patients. Permission was taken from the ethical review committee of the institute. Acute open grade III tibia fractures with >5cms of bone loss and infected non-union with or without prior history of internal fixation were included in this study

Study subjects with serious medical comorbidities and metabolic disorders, as well as those who smoked heavily and had irreparable Tibial nerve injury, were disqualified from the study. Until the frame was removed, follow-up was done monthly. The individuals were clinically evaluated based on their medical histories and physical examinations. Plain anteroposterior and true lateral radiographs were used to evaluate the afflicted limb

radiologically. Pin-track infection, wire loosening, axial deviation, mal-union, wire breakage, knee and ankle stiffness, and limb oedema, were all reported as complications. The findings were analysed using percentages.SPSS version 23 was used for data analysis.

Results:

All n=55 patients' medical records and serial radiographs were examined. The average age in our study was 38.4 years. Out of the 55 cases, 48 (87.27%) were male, and 7 (12.73%) were female. Out of 55 instances, 47 (85.4 %) involved the right tibia. There was a history of roadside collision in 51 (92%) cases and a history of fall from height in 4 (7%) cases. In 10 cases (18.14%), the proximal tibial shaft was impacted, while the intermediate and distal tibial shafts were afflicted in 30 (54.53%) and 15 (27.27%) cases, respectively. (As shown in Table 1). Infected non-union with bone loss accounted for 38 (69.09%) of the 55 cases, while open fracture IIIB/IIIC with bone loss accounted for 17 (30.09%). The average consolidation period was 7.9 months, with a 7.2 cm average bone lengthening. Limp was existing in n=38 cases (45%), pin site infection in n=21 (38 %), ankle stiffness n=12 (28.34 %), limb oedema n=14 (28.09 %), pain n=13 (18.37 %), knee stiffness n=6 (15 %), loosening of pins n=1 (3.3 %), deformity (>7 degree) n=4 (3.4 %), and refracture n=3 (4.4 %). (As shown in Figure 1) There was no non-union, neurovascular damage, malunion, wire breakage, limb length disparity were observed due to the procedure.

Table-1: Demographic Characteristics of the Participants

Characteristics	No. of patients n=55	%
Average age	38.4±11.4 years	
Gender		
Male	48	87.27
Female	7	12.73
Mode of injury		
Roadside collision	51	92
Fall from height	4	7
Side effected		
Proximal tibial shaft	10	18.14
Intermediate tibial shafts	30	54.53
Distal tibial shafts	15	27.27

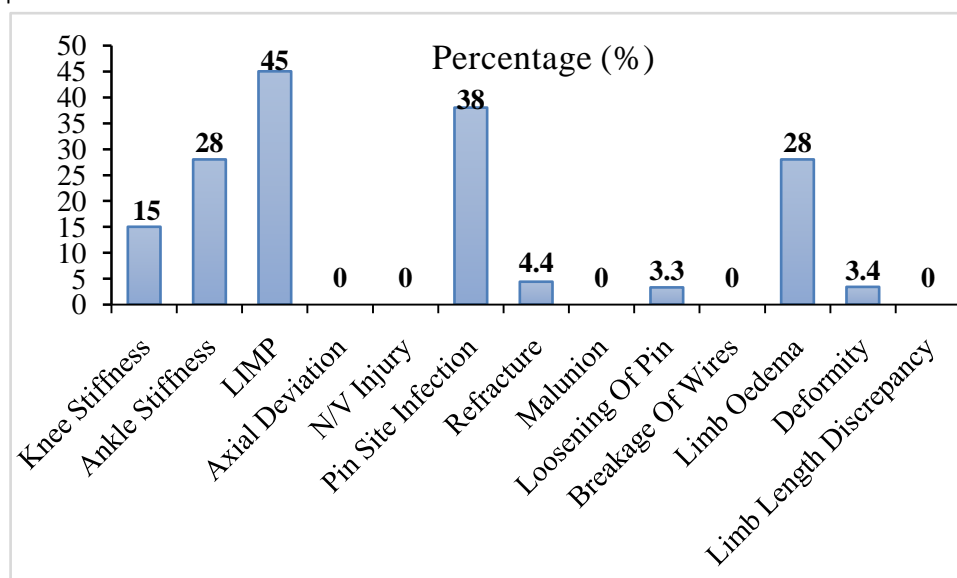


Figure 1: Percentage of Complications

Discussion:-

Infected non-union of the tibia can be difficult to treat with segmental bone loss, many draining sinuses, insufficient soft tissue coverage, osteopenia, surrounding joint stiffness, limb deformity, or a multidrug-resistant polymicrobial infection. (11) Amputation can result in permanent functional losses and protracted recuperation times. (12) The goal of this longitudinal study was to assess complications associated with the Ilizarov ring fixator in open tibial fractures.

In this study, 55 individuals were included, and the average age was 38.4 ± 11.4 years. Out of the 55 cases, 48 (87.27%) were male, and 7 (12.73%) were female. A similar study was conducted in Peshawar Hospital, Pakistan that Ilizarov was used to treat 90 individuals for a variety of reasons. Males made up 65 % of the population and were dominant (72.2 %), while females made up only 25 % (27.8%). (13)

The current study had a 100% union rate. Multiples studies were conducted by the different scientists on the Ilizarov fixator. (14-17) One of the most prevalent Ilizarov consequences is pin site infection. In the current study, infection at the pin site was found in 38% of the cases. While different researches found infection at the pin site approx. 36 %, 60.6 %, and 45 % of cases, in investigations on the Ilizarov fixator. (15, 17-19)

According to Messner et al., this fixator technique is a harmless, operational, and reliable procedure for treating tibial fractures with good but short-term results. (20) In this study, the entire complication rate of deformity existed at 3.4% whereas, Limp was existing in n=38 cases (45%), pin site infection in n=21 (38 %), ankle stiffness n=12 (28.34 %), limb oedema n=14 (28.09 %). This was similar to the findings of Ali et al., who found pin tract infections in n=29 (32.2%) of the patients. Knee stiffness was another consequence that occurred in 13.3 % of the 90 patients in the study. (13) Raza et al. found a similar finding, reporting that out of 22 cases, 18 patients had pin-tract infection. (21) Other research examined the rate of complications with external fixation devices and suggested potential treatments. On the other

hand, these publications are only concerned with short-term problems or deformity treatment. (22-24)

The current study shows that the Ilizarov procedure can be used to treat infected tibial non-union even in impoverished nations like Pakistan, where resources and knowledge are scarce. Despite the constraints of a resource-constrained environment, the success rate and issues are comparable to those documented in international literature.

However, the lack of a control group is a flaw in this study. As a result, large-scale prospective and multi-center studies, particularly from poor countries, are still required to support the current study's conclusions.

Conclusion: -The most common consequences were limb and pin tract infection. The majority of problems can be avoided with proper post-operative care. Complications can be adequately handled if detected early.

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None

Conflict of interest

None

Permission

Permission was taken from the ethical review committee of the institute

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