



Research Article

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Comparison of Pin Site Infection Rate between Schanz Screws And K-Wires in Ilizarov Fixator for Tibial Fracture

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Abstract

Introduction: Different methods are used to fix external fixator after tibial fracture each having advantages and disadvantages.

Objectives: To compare frequency of pin site infection rate between Schanz screws and k-wires in Ilizarov fixator for tibial fracture.

Material and Methods: This Randomized control trial Study was conducted in the Department of Orthopedics, Lady Reading Hospital Medical Teaching Institute Peshawar Pakistan from September 2022 till March 2023 on 166 patients aged 20 to 60 years of both gender undergoing Ilizarov fixation after isolated fracture of tibia were enrolled using non-probability consecutive sampling technique, after approval of hospital ethical committee and written informed consent of patients. Patients were randomly divided into two groups using computer generated random sequence number. Patients in group A were stabilized using K-wires and patients in group B were stabilized using K-wire and Schanz screws. Pin site infection was noted in both groups at the end of 12 weeks. Data was entered and analyzed using SPSS 22.

Results: In our study 166 patients were enrolled, 83 patients in each group. Mean age was 35.83 ± 7.1 years in group A and 37.7 ± 11.6 years in group B. There were 66.3% males in group A and 69.9% males in group B, females were 33.7% in group and 30.1% in group B. Pin site infection was more common in K-wire group as compared to Schanz group i.e., 18.1% versus 7.2%, p-value 0.036.

Conclusion: Schanz screw is associated with decrease pin site infection rate as compared to K-wire in Ilizarov fixator for tibial fracture.

Keywords: Infection, K-wire, Pin, Schanz screw, Tibial fracture.

Introduction

Ilizarov fixator is an external fixator use for the treatment of variety of bone conditions; to lengthen bones, fix fractured bones, to correct different angular deformities height increase, to treat infected non-union or mal-union of bones and comminuted fractures even with skin loss by using circular rings 1-3 attached to bone with tightened Kirschner wires and Schanz screw/pin. [1] Pin site infection undoubtedly is the commonest complication associated with Ilizarov external fixation. Reported pin site infection rates in vary from 2% to 35%. [2].

Though antiseptics are used by many surgeons to prevent pin site infections, clear-cut evidence to support their use remains

uncertain. Also, the recommendation for the frequency of pin site care varies from four times a day to as much as once in a week. Some studies have gone to the extent of recommending that pin sites can be just left untouched after application of external fixators. In summary, there are no evidence-based recommendations for routine pin site care in external fixators, including Ilizarov devices [3].

Pin Site Infections (PSI) results in redness around entry of wire into the skin, tenderness, discharge from same site and sometimes systemic manifestations of inflammation and may results into drastic complications like osteomyelitis. It's always a challenging condition for surgeons in case of implants [4, 5, 6]. Different



techniques have been used to reduce pin site infection and save implants. [7, 8] In previous study Fractures in group A patients were stabilized by using K-wires while in group B it was stabilized with Schanz screws. Patients were reviewed after 6 weeks and assessed for pin site infection. In Group A, 5% patients had pin site infection while in Group B, 17% patients had PSI ($p=0.02$) [9]. The rationale of this study is to determine the frequency of pin site between Schanz screws versus K-wires in Ilizarov fixator as no such study has been conducted on our local population in recent years. Current study would provide latest data and updated information about pin site infection in both implants being used routinely in Ilizarov

Objective

To compare frequency of pin site infection rate between Schanz screws and K-wires in Ilizarov fixator for tibial fracture

Materials and Methods

This Randomized control trial Study was conducted in the Department of Orthopedics, Lady Reading Hospital Medical Teaching Institute Peshawar Pakistan from September, 2022 till March, 2023 on 166 patients enrolled using non-probability consecutive sampling technique, after approval of hospital ethical committee and written informed consent of patients.

Sample size was calculated using WHO calculator keeping 80 % power of study, 5% infection rate in k-wires and 17% in Schanz screws. [6] Sample size will be 83 patients in each group Patients aged 20 to 60 years, of both gender, undergoing Ilizarov fixation after isolated fracture of tibia were included in the study while Patients with chronic disease like renal failure or diabetes causing poor wound healing, unfit for anesthesia or polytrauma patients requiring fixation of other bones or other specialties were excluded from the study.

After approval from hospital ethical board, patients fulfilling the inclusion criteria were enrolled from orthopedic indoor of LRH. A written informed consent was taken after explaining the purpose of study. Demographic data including age, gender and duration of injury was noted. Complete history was taken and physical examination was done. Baseline labs including CBC, LFT, RFT, serum electrolyte and chest x ray as done for general anesthesia fitness.

Patients were divided in two groups using computer generated random sequence number. Patients in group A were stabilized using K-wires and patients in group B were stabilized using k-wire and Schanz screws. Patients were followed till 12 weeks or earlier removal, for development of pin site infection as per operational definition. Patients were called for follow-up on 2nd, 4th, 6th, 8th, 10th and 12th week. Data was entered in specially designed proforma. Data was entered and analyzed by using SPSS version 22.0. Post stratification chi square was applied. P value ≤ 0.05 was taken as statistical significant. Moore and Dahl pin site classification

system was used in our study to classify pin site infection [10].

Moore and Dahl pin site classification.

Grade Inflammation

1. None or marginal
2. Marginal inflammation
3. Inflamed – serous
4. Inflamed – purulent
5. Inflamed with induration – seropurulent
6. Inflamed with induration, tenderness, surrounding erythema – gross purulent

Results

In our study 166 patients were enrolled, 83 patients in each group. Mean age was 35.83 ± 7.1 years in group A and 37.7 ± 11.6 years in group B (Table 1).

There were 66.3% males in group A and 69.9% males in group B, females were 33.7% in group and 30.1% in group B (Table 2).

Mean duration of injury was 8.9 ± 3.2 days in group A and 9 ± 3.5 days in group B (Table 3).

Pin site infection was more common in K-wire group as compared to Schanz group i.e. 18.1% versus 7.2%, p -value 0.036 (Table 4).

Data stratification was done for age group, gender and duration of injury (Table 5, 6, 7).

Discussion

In the mid-1960s, Dr. Gavril Ilizarov revolutionised Orthopedic management of difficult fractures, with his invention of ring external fixator, by treating his first patient with this technique in 1950s. Many have adapted and modified this fixator, but the principles remain the same. Ilizarov fixator is an external fixator use for the treatment of variety of bone conditions; to lengthen bones, fix fractured bones, to correct different angular deformities height increase, to treat infected non-union or mal-union of bones and comminuted fractures even with skin loss by using circular rings 1-3 attached to bone with tightened Kirshner wires and Schanz screw. Pin site infection undoubtedly is the commonest complication associated with Ilizarov external fixation. Reported pin site infection rates vary from 2% to 35% [11].

Though antiseptics are used by many surgeons to prevent pin site infections, clear-cut evidence to support their use remains uncertain. Also, the recommendation for the frequency of pin site care varies from four times a day to as much as once in a week. Some studies have gone to the extent of recommending that pin sites can be just left untouched after application of external fixators.

In summary, there are no evidence-based recommendations for routine pin site care in external fixators, including Ilizarov devices [12].

Pin Site Infections (PSI) results in redness around entry of wire into the skin, tenderness, discharge from same site and sometimes systemic manifestations of inflammation and may results into drastic complications like osteomyelitis. It's always a challenging condition for surgeons in the case of implants [13]. This study was done to determine frequency of pins site infection after K-wire versus Schanz screw in external fixator use. In our study 166 patients were enrolled, 83 patients in each group. Mean age was 35.83 ± 7.1 years in group A and 37.7 ± 11.6 years in group B. There were 66.3% males in group A and 69.9% males in group B, females were 33.7% in group and 30.1% in group B. Mean duration of injury was 8.9 ± 3.2 days in group A and 9 ± 3.5 days in group B. Pin site infection was more common in K-wire group as compared to Schanz group i.e. 18.1% versus 7.2%, p-value 0.036.

Our results were similar to other studies in literature. A randomized control trial was conducted at Department of Orthopedics, Khyber Teaching Hospital, Peshawar and included 150 patients randomized into two groups (75 in each group) by block method. Fractures in group A patients were stabilized by using K-wires while in group B it was stabilized with Schanz screws. Patients were reviewed after 6 weeks and assessed for pin site infection. Mean age in group A was 35 ± 2.77 years and mean age in group B was 38 ± 3.12 years. In Group A, 71% patients were male and 29% female. In Group B, 72% patients were male and 28% female. In Group A, 5% patients had pin site infection while in Group B, 17% patients had PSI (p=0.02). Stratification against time of PSI development showed a weak relationship (p=0.04), being more common in patients of group A in patients who presented till 5th day, although there was no significant difference in PSI rates among both groups after 5 days (p=0.2) [9].

Similar results were observed in another study conducted by Ali, et al. [14] in which out of 40 patients 29 patients (72.5%) developed PSI, 91 (10.8%) K wires sites developed infection and out of these 77 (9.14%) had superficial infection and 14 (1.66%) had deep infection. Thirteen (07.1%) Schanz screw sites had infection and out of these 11 (06.01%) were superficial and 02 (01.09%) were deep infection. These results are almost comparable to ours [14].

Pin site infection rates vary from region to region as it mostly depends on surgical techniques, scrub, staff and level of cleanness of operation theatres and even on the study designs and methodologies of previous study also make infection rates vary from study to study and hence region to region [15]. However, in one study different results were seen. Patients in group A were stabilized using K-wires and patients in group B were stabilized

using k-wire and schanz screws. The mean age in group A patients was 35 ± 2.77 years, while in group B it was 38 ± 3.12 years. Gender distribution between two groups was analyzed. In Group A 72.3% were males and 27.7 % females while in Group B patients, 70% were males and 30% were females. Mean duration from injury to surgery was 5 days with $SD \pm 2.12$ in group A, while 5.5 ± 2.37 days in Group B. Analysis of PSI among both groups shows that Group B, in whom Schanz pins technique was used, had significantly high rates of pin site infection (24.1%) compared to group A (9.6%) in whom K-wires technique was used (p 0.012) [16]. The study did not mentioned the antiseptic technique used for prevention if pin site infection.

Conclusion

Infection in orthopedics is very disastrous in orthopedic specialty and the surgeon do utmost to eradicate it in every step of surgery. Using hybrid Ilizarov can cause pin site infection that's why the followers of Russian Ilizarov technique do not use pins. Our study concludes that the frequency of pin site infection is significantly less in Ilizarov fixator using K-wires as compared to Ilizarov fixator using Schanz pins.

Acknowledgments

None.

Conflict of Interest

None.

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