

HAZARDOUS ASPECTS AFFECTING PATIENT COMPLIANCE WITH FRAME CARE IN ILIZAROV SURGERY AT SINDH, PAKISTAN

KHAN N¹, SIDDIQI A², SIYAL S^{3*}, SHAIKH MA³, SHAIKH A⁴, LAGHARI AR⁵, SIYAL FJ⁶

¹Department of Orthopedics at ICS Jinnah Medical and Dental College, Pakistan

²Nuffield orthopedic center United Kingdom

³Department of Orthopedics, CMC at Shaheed Mohtarma Benazir Bhutto Medical university Larkana, Pakistan

⁴Department of Pharmacology, BADC at Shaheed Mohtarma Benazir Bhutto Medical university Larkana, Pakistan

⁵Department of Orthopedics, GMMMC at Shaheed Mohtarma Benazir Bhutto Medical university Larkana, Pakistan

⁶Department of Pharmacology, CMC at Shaheed Mohtarma Benazir Bhutto Medical university Larkana, Pakistan

Corresponding author email address: Prince_shaaaj@hotmail.com

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Abstract To assess risk factors affecting patient compliance and motivation and their interplay with adverse events affecting the outcome of Ilizarov surgery in a tertiary care hospital. The study was performed at the Orthopaedics Department, Liaquat National Hospital, Karachi, for 3 years (January 2014 to January 2017). The ethics review committee approved the study. During this period, 260 patients were operated with Ilizarov in our center. The mean age was 30 years. Factors examined include family income, living conditions, level of education, ethnic/cultural background, language barrier etc. Outcome measures were pin tract infection and treatment failure, such as abandoning treatment or amputation. Out of 193 patients, 148(76.6%) patients were males and 45(23.3%) patients were females. 44(22.7%) patients had underlying systemic diseases such as Hypertension and Diabetes mellitus. Out of 44 patients, 26(13.4%) patients had Hypertension and 18(9.3%) patients had Diabetes mellitus. Out of 193 patients, 157(81%) had favorable outcome whereas 37(19.1%) patients had unfavorable outcomes. Out of 37 patients, we had 28(75.6%) pin tract infections. Most were treated conservatively with antibiotics and dressings. There were 9(24.3%) patients with failure of treatment. The ethnic background of the patient, level of education, living conditions etc played a significant role in preventing developing pin tract infections and treatment failure.

Keywords: Ilizarov; Risk factors; Adverse events; Hypertension; Diabetes mellitus

Introduction

The circular wire Ilizarov fixator is invaluable in managing deformity, infection, acute trauma, and sequelae of neglected or mismanaged trauma rampant in the developing world (Ilizarov, 1990). However, many factors influence outcomes, such as pin site infections, osteomyelitis, pin breakage, and treatment failure (Prabhu *et al.*, 2016). This may increase the financial burden on healthcare provision (Jerzy and Francis, 2018). Complications are common during treatment with the ilizarov device (Dendrinis *et al.*, 1995). However, these potential sources of residual morbidity are not factored into the standard outcome of ilizarov device. Most Ilizarov surgeons agree that patient motivation and participation in the treatment are essential to prevent adverse events and have a fruitful result (Novikov *et al.*, 2014). Various factors like inadequate treatment, poverty, and health service inaccessibility all contribute to adverse events in the developing world (Sharma, 2018). Our study aims to evaluate risk factors affecting patient compliance and motivation

and their interplay with adverse events affecting the outcome of Ilizarov surgery in a tertiary care referral hospital in the largest city of Pakistan.

Material & methods

This is a retrospective review of prospectively collected data from the hospital's Ilizarov registry. The study was performed at the Orthopaedics Department, LNH (Liaquat National Hospital), Karachi, for 3 years (January 2014 to January 2017). The ethics review committee of the hospital approved the study. During this period, 260 patients were operated with Ilizarov in our center. The mean age was 30 years (Range 18-42).

Inclusion criteria

1. All patients were treated with ring fixators of all age groups and genders.

Exclusion criteria

1. Those who had previous ilizarov applications on the same limb.
2. Patients with mental disorders such as dementia or psychiatric illness.

3. Patients on immunosuppressive medications/immunocompromised due to illness.

Informed consent was obtained before administering a standardized study proforma to patients on clinical follow-up. Factors examined include family income, living conditions, level of education, ethnic/cultural background, language barrier etc. The risk factors that significantly affected patient compliance towards frame care as per significant P value (< 0.05) were analyzed through logistic regression using multivariable analysis. Outcome measures were pin tract infection and treatment failures, such as abandoning treatment or amputation secondary to a fulminant infection, reflex sympathetic dystrophy (RSD), or vascular compromise. All surgeries were performed by a single surgeon who is fellowship-trained and has 6 year of experience in Ilizarov surgeries. Prophylactic antibiotics were given 30 minutes before the start of the procedure. 1st generation cephalosporin (cefazolin) at 3mg/kg was used for prophylaxis. We all used chlorhexidine solution for skin sterilization and disposable surgical gowns. We divided monthly family income into four groups- below 150, 150-350, 350-700, and more than 700. Family living standards are categorized into Urban Villa, Urban apartments, Urban slum, and Rural. The level of education can be literate, matriculation, high school, and graduation. Ethnic background can be Sindhi, Urdu speaking, Pashtun, Baloch, Punjabi, or others. We divide the medium of patient counseling into three- one can understand the surgeon's language, uses a family member as a translator, or use a professional translator. The data was analyzed statistically using SPSS version 20.0. Categorical variables were compared through Chi-square test and the Fisher exact test. Multivariable analysis was done to identify the factors independently affecting patient compliance towards frame care. The level of significance was set at p-value < 0.05 .

Results

Out of 260 patients, 48 were lost to follow-up, and 19 refused to consent for inclusion. Therefore, there were a total 193 patients available for complete analysis. Out of 193 patients, 148(76.6%) patients were males and 45(23.3%) patients were females. 44(22.7%) patients had underlying systemic diseases such as Hypertension and Diabetes mellitus. Out of 44 patients, 26(13.4%) patients had Hypertension and 18(9.3%) patients had Diabetes mellitus. In our study, we commonly applied ilizarov on the tibia in 123(63.7%) patients, followed by the femur 56(29%) and the humerus 14(7.2%). Most common indication for application of ilizarov in our study was infected nonunion 98(50.7%) followed by juxta-articular fractures 37(19.2%), deformity correction 29(15.1%), non-infected nonunion 24(12.4%), and others 5(2.5%) as shown in Table 1.

Out of 193 patients, 157(81%) had favorable outcome whereas 37(19.1%) patients had unfavorable outcome. Out of 37 patients, we had 28(75.6%) pin tract infections. Most were treated conservatively with antibiotics and dressings. There were 9(24.3%) patients with failure of treatment. Out of 9 patients, 4(44.4%) had abandoned treatment, whereas 5(55.5%) patients underwent amputation. 2 were due to fulminant infection, 2 to painful RSD, and 1 to vascular compromise. The breakup of adverse events is found in figure 1. Factors affecting patient compliance towards frame care are presented in Figures 2 to 6. Descriptive statistics of qualitative variables are presented in table 2. Multivariable analysis showed that living standard, level of education, ethnic background, and language barrier are independent risk factors, as shown in the table 3.

Discussion

The ilizarov apparatus, due to its versatility, remains a solution for many orthopaedic problems in the developing world. Several adverse events are encountered during the treatment period. Cultural practices define a patient's motivation level for proper frame care. A clinician practicing in Pakistan should be aware of risk factors affecting patient outcomes and tailor his treatment strategy and counseling appropriately to get optimal results from the treatment with minimal complications. In our study, 193 patients were evaluated and 37(19%) had unfavorable outcomes. Of 37 patients, 28(75.6%) had pin tract infections in the present study. Girish H Rudrappa (Debnath et al., 2018) observed unfavorable outcomes in 9(45%) patients out of 20, and he found the association between pin tract infection and outcome statistically significant with P value < 0.001 . In the case series presented by J L Marsh et al (1995), 4(20%) patients out of 20 had pin tract infections. We believe that Ilizarov technique is likely to have a high complication rate because most cases have long treatment, which can create the wrong perception that the ilizarov technique is too difficult to perform. However, it is logical to accept the risk of complication alongside the wide range of opportunities provided by ilizarov technique (Uysal, 2018).

Lack of education and poverty is another dilemma of developing countries like Pakistan. People who live in developing countries have more belief in faith healers. They think that healing is achieved by religious belief and prayer rather than by medical treatment (Shankar et al., 2007), which may lead to either discontinuing treatment or the patient might end up with amputation. Most of the patients in our study were illiterate, as shown in Figure 4. Illiterate patients in our study had more amputations than those who attained the highest education level. In the case study done by UNICEF in Nepal, they

reconfirm the link between poverty and education. The study shows that higher education levels lower the chances of being poor (Nasreen et al., 2007). This indicates that education is the base for socioeconomic development. In Pakistan the quality of education is on the decline even though the present government has initiated measures to improve the quality and quantity of education still the efficiency of the education sector in Pakistan is questionable. This is due to insufficient financial input and poor quality of management, monitoring, supervision, and teaching (Memon, 2007). Pakistan is an agricultural country, with 80% of its people from its rural population. The villages and small cities form rural areas of Pakistan. They pursue different professions to earn their livelihood. People living in rural areas face more challenges in obtaining a quality education than those living in urban areas (Sowell et al., 1997). In the present study, living standard is an independent risk factor that affects outcomes with a P value <0.05. This is due to the inaccessibility of health services in the rural areas because of inequitable distribution of health care professionals to Rural and Urban areas

(WHO, 2000). Language barriers in developing countries present a major obstacle to ethnic communities accessing primary healthcare. In the present study, a patient using family members as a translator had more adverse events. It is recognized that interpreting services are generally inadequate, and inappropriate reliance is placed on family members to interpret (Gerrish et al., 2004). We believe that primary care nurses in developing countries should be available to communicate with the patients rather than rely on family members to interpret. The major drawback of the current study was a single center study, small sample size, results subject to the hospital's catchment area, and a more robust methodology with a larger sample size from a multicentric pool is required to validate our results.

Conclusion

We found that ethnic background of the patient, level of education, congested living conditions, and the patients' interest in frame care played a significant role in preventing developing pin tract infections and treatment failure. However, monthly income was not a risk factor.

TABLE 1: DISTRIBUTION OF PATIENTS ACCORDING TO INDICATION OF ILIZAROV: (n=193)

Indications	Number of patients (n=193)	P value
Infected nonunion	98(50.7%)	0.004*
Juxta-articular fractures	37(19.2%)	
Deformity correction	29(15.1%)	
Non-infected nonunion	24(12.4%)	
Others	5(2.5%)	

*P value <0.05 considered significant.

TABLE 2: DESCRIPTIVE STATISTICS OF QUALITATIVE VARIABLES: (n=193)

Variables	Number of patients (%)
Gender	
Male	148(76.6%)
Female	45(23.3%)
Comorbids	
Hypertension	26(13.4%)
Diabetes mellitus	18(9.3%)
Frame site	
Tibia	123(63.7%)
Femur	56(29.0%)
Humerus	14(7.2%)

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TABLE 3: MULTIVARIABLE ANALYSIS:

VARIABLE	ODDS RATIO	95% CI	P value
Monthly income	1.286	1.286-1.774	0.068
Living standard	4.246	1.085-1.440	0.014*
Level of education	13.921	0.811-1.224	0.003*
Ethnic background	17.238	0.775-1.217	0.002*
Language barrier	9.352	1.020-1.463	0.008*

*P value<0.05 considered significant.

CI: Confidence interval.

Figure 1:

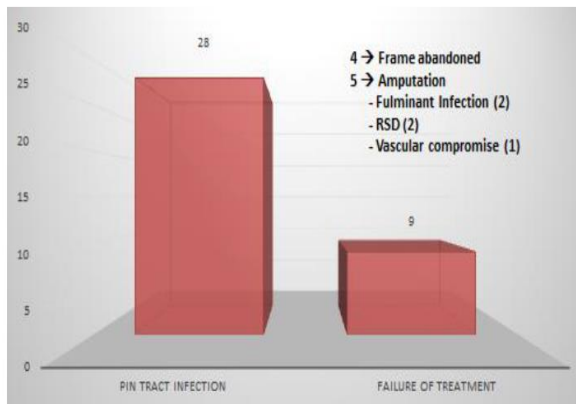


Figure 2:

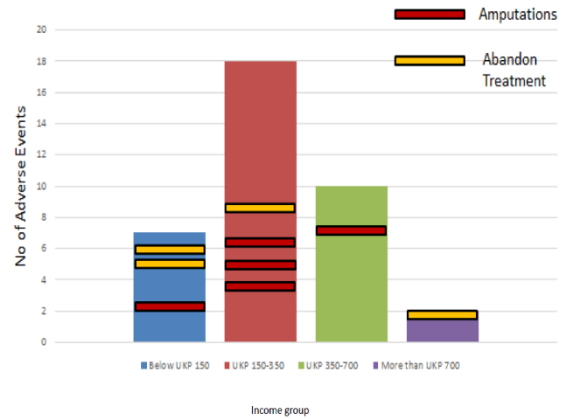


Figure 3:

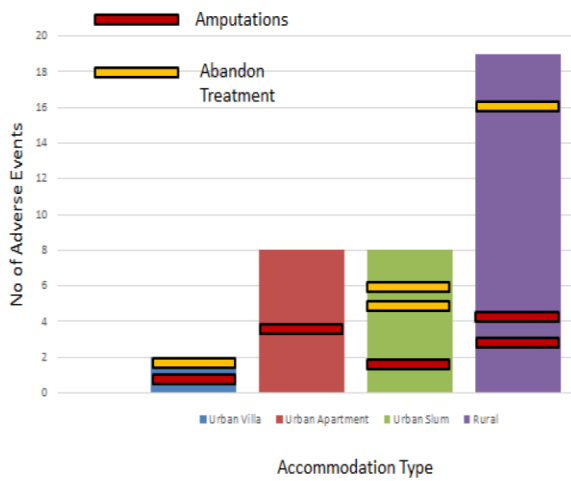
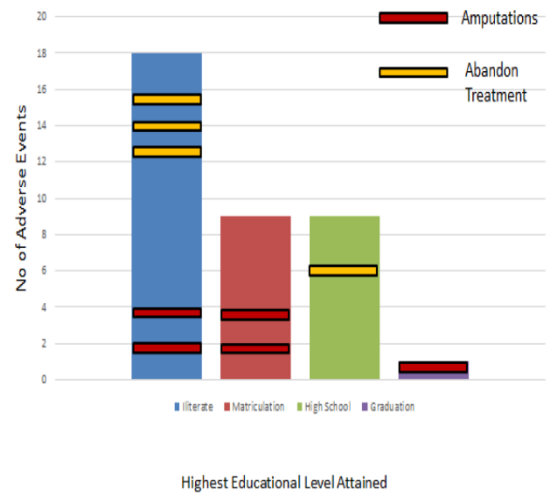


Figure 4:



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Figure 5:

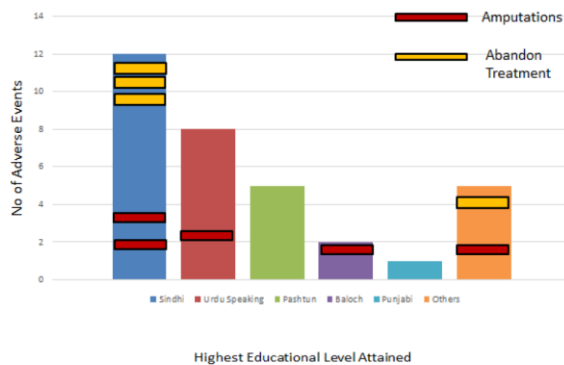
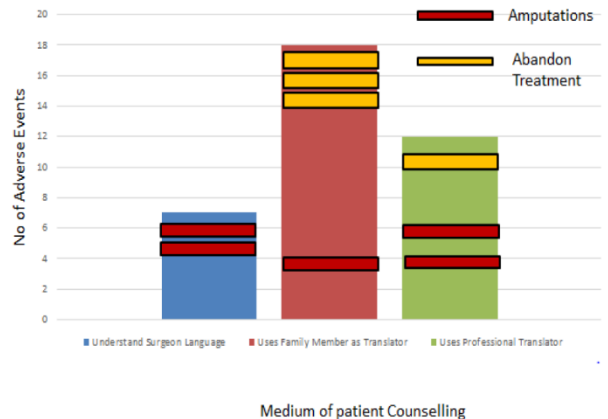


Figure 6:



Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Funding

Not applicable

Conflict of Interest

Regarding conflicts of interest, the authors state that their research was carried out independently without any affiliations or financial ties that could raise concerns about biases.

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