Assessment of complications of K-Wire fixation in procedures involving the Hand and Wrist fractures

Dr.Sumit Pal Singh[1],Dr.Nitish Sharma[2],Dr.Shubham Pandoh[3],Dr.Manmeet Singh[4],Dr. Anil Gupta[5]

[1](MBBS , MS Orthopaedics), Senior Resident Department Of Orthopaedics GMC Jammu

[2,3,4](MBBS), Post Graduate Department Of Orthopaedics GMC Jammu

[5]Professor and Ex HOD, Department Of Orthopaedics GMC Jammu

Corresponding Author: Dr.Pallav Gupta

ABSTRACT

Background: Insertion of smooth Kirschner wire (K-wires) is a common surgical technique for bone stabilization in the hand and wrist fractures.The present study was conducted to evaluate complications of K-Wire fixation in procedures involving the Hand and Wrist fractures.

Materials & Methods:84 patients of Hand and Wrist fractures of both genders were enrolled. Patients were followed for 6–52 weeks after removal of the pins and complications wererecorded.

Results: Out of 84 patients, 30 weremalesand 54females. Cause of fracture was RTA in 56, fall in 20 and violence in 8 cases. Site of fracture was carpus in 24, Meta- carpus in 30, Phalanges in 16 and distal radius in 14. The difference was significant (P< 0.05). Complications were pin loosening in 2, pin migration in 1, osteomyelitis in 1, skin overgrowth in 4, delayed wound healing in 1, superficial pin track infection in 2 and non-union in 1 case. The difference was statistically significant (P< 0.05).

Conclusion: Most common complications in treatment of Hand and wrist fracture with L- wires was skin overgrowth, delayed wound healing and superficial pin track infection.

Key words: Hand and wrist fracture, Kirschner wire delayed wound healing

DOI Number: 10.14704/nq.2022.20.6.NQ22849 **NeuroQuantology 2022; 20(6): 8588-8592**

Introduction

Insertion of smooth Kirschner wire (K-wires) is a common surgical technique for fracture stabilization in the hand and wrist. K-wires are relatively inexpensive and have versatile in application.[1] However, complications may develop, with reported rates as high as 44%, including pin migration, pin breakage, fracture malunion, fracture non-union, superficial pin track infection, nerve injury, deep infection, osteomyelitis, and toxic shock syndrome.[2,3]

Kirschner wire (K-wire) fixation is a simple, reliable and cost- effective method of treatment.[4] Biomechanical studies of metacarpal and phalangeal fractures have shown no significant difference between the rigidity of Kirschner pin and intra-osseus wiring and other methods of fixation, K-wire fixation is the most available and forgiving technique for fixation of most fractures and dislocations in the hand and wrist.[5]Our current understanding of complications related to K-wire fixation in the hand and wrist is based primarily on retrospective reviews and extrapolated from reports on external fixation devices using threaded pin.[6]The present study was conducted to evaluate complications of K-Wire fixation in procedures involving the Hand and Wrist fractures.

Materials & Methods

The present study comprised of 84 patients of Hand and Wrist fractures of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. A thorough clinical examination was carried out. X-rays were taken. In all patients, smooth stainless steel pins measuring 0.9–1.6 mm in diameter were inserted with a power drill and saline irrigation. Pins were left protruding through the skin with the exposed portion bent at an acute angle, or were cut off beneath the skin. The pins were cleaned daily with polydine. Pins in the phalanges were usually removed after 3–8 weeks, those in the metacarpus after 4–6 weeks, and those in the carpus and distal radius after 6–8 weeks. Patients were followed for 6–52 weeks after removal of the pins and complications were recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of patients

Total- 84		
Gender	**Males**	**Females**
Number	30	54

Table I shows thatout of 84 patients, males were 30 and females were 54.

Table II Assessment of parameters

Parameters	Variables	Number	P value
Cause	RTA	56	0.05
	Fall	20	
	violence	8	
site	carpus	24	0.12
	Meta- carpus	30	
	Phalanges	16	
	distal radius	14	

Table II, graph I shows that causes of fracture was RTA in 56, fall in 20 and violence in 8 cases. Site of fracture was carpus in 24, Meta- carpus in 30, Phalanges in 16 and distal radius in 14. The difference was significant (P< 0.05).

Graph IAssessment of parameters

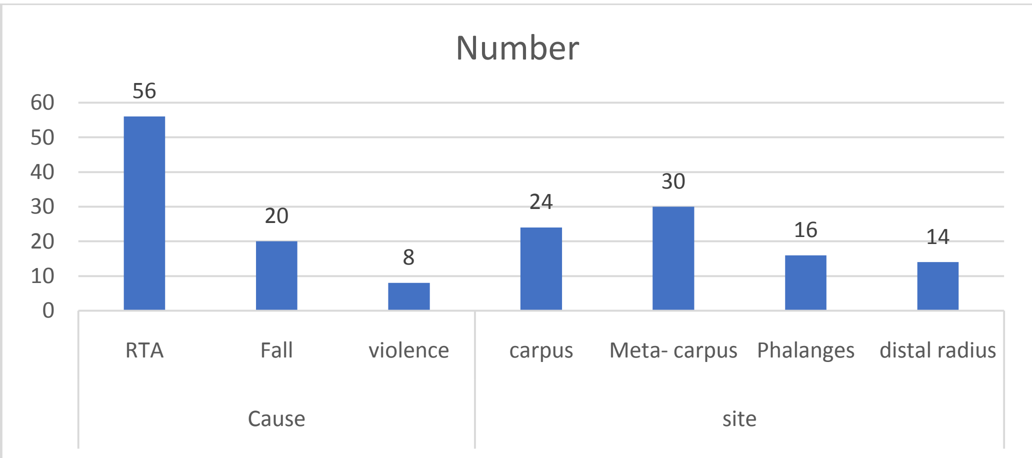
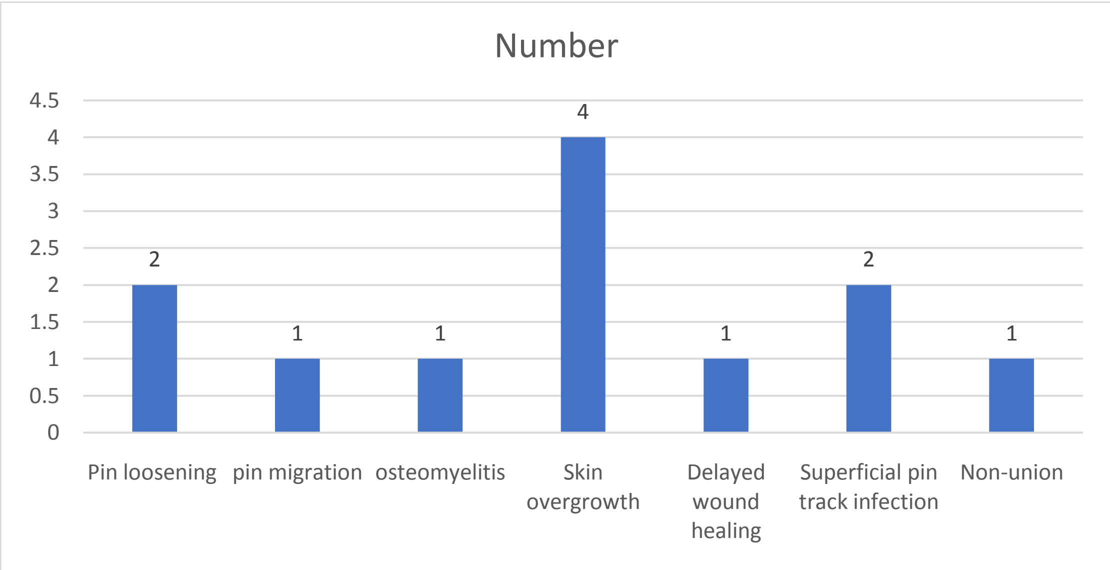


Table III Evaluation of complications

Complications	Number	P value
Pin loosening	2	0.05
pin migration	1	
osteomyelitis	1	
Skin overgrowth	4	
Delayed wound healing	1	
Superficial pin track infection	2	
Non-union	1	

Table III, graph II shows that complications were pin loosening in 2, pin migration in 1, osteomyelitis in 1, skin overgrowth in 4, delayed wound healing in 1, superficial pin track infection in 2 and non-union in 1 case. The difference was significant (P< 0.05).

Graph IIEvaluation of complications



Discussion

Smooth K-wire fixation is a common and versatile method of internal fixation of fractures in the hand and wrist, often used also for treatment of mallet finger or for performing an arthrodesis.[7,8]Little attention has been directed specifically to the pitfalls and complications associated with the use of K-wire fixations.[9]The present study was conducted to evaluate complications of K-Wire fixation in procedures involving the Hand and Wrist fractures.

We found that out of 84 patients, males were 30 and females were 54.Stahl[10] also detected a greater number of infections in patients who failed to routinely clean around protruding pins. Of the 590 K-wire fixations performed on 236 patients, 36 (15.2%) experienced complications which included osteomyelitis, tendon rupture, nerve lesion, pin tract infection, pin loosening or migration. There were no deep soft-tissue pin infections or pyarthrosis. Technical failure, mainly when the procedure was performed by residents, and poor patient compliance were the major causes of complications. K-wire fixation is a simple but demanding procedure that cannot be left to an inexperienced resident. Elimination of technical failure, supervision in the operating room, close monitoring, prompt treatment upon discovery of a complication, and improvement of patient compliance can reduce the rate of complications.

We found that causes of fracture was RTA in 56, fall in 20 and violence in 8 cases. Site of fracture was carpus in 24, Meta- carpus in 30, Phalanges in 16 and distal radius in 14. Egol et al[11] compared 3 different pin care techniques for external fixation pins about the wrist and detected no differences in the prevalence of infection with dry dressing changes, hydrogen peroxide wound care, or chlorhexidine-impregnated dressings.

We observed that complicationswere pin loosening in 2, pin migration in 1, osteomyelitis in 1, skin overgrowth in 4, delayed wound healing in 1, superficial pin track infection in 2 and non-union in 1 case. Hsu et al reported incidence of postoperative complications of K-wire fixation in the hand and wrist and to identify associated risk factors.[11]A total of 189 patients underwent bone and soft tissue procedures in the hand and wrist with insertion of 408 smooth K-wires. All patients were instructed to comply with a uniform pin care protocol and were observed for a minimum of 1 examination after pin removal. Complications were categorized as minor or major, with 3 subcategories for infectious complications. They compared total complications and infectious complications with patient age, comorbidities, soft tissue integrity, pin exposure (external or buried), number of pins inserted, pin location, compliance with pin site care, and empiric antibiotic treatment. They found that 39 patients experienced postoperative complications involving 58 K-wires (14% of all pins). Most complications were minor, commonly superficial pin track infection (24 pins, 6% of all pins). Major complications occurred less frequently (11 pins, 3% of all pins) and included complications that led to additional surgery (deep infection, malunion, or non-union) and fractures through the pin track. The development of an infectious complication was associated with 2 factors: pin location in the hand versus the wrist and poor compliance with pin site care. Patient age, medical comorbidities, soft tissue integrity, pin exposure, number of pins inserted, and empiric antibiotic treatment had no statistically significant relationships to the occurrence of complications. Lethabyet al[12] performed a Cochrane database analysis and found no evidence to support the superiority of 1 pin care technique over another.

The limitation the study is small sample size.

Conclusion

Authors found that most common complications in treatment of Hand and wrist fracture with K- wires was skin overgrowth, delayed wound healing and superficial pin track infection.

References

1. Green SA. Complications of pin and wire external fixation. Instr Course Lect 1990;39:219 –228.
2. Battle J, Carmichael K. Incidence of pin track infections in children’s fractures treated with Kirschner wire fixation. J PediatrOrthop 2007;27:154 –157.
3. Ahlborg H, Josefsson P. Pin-tract complications in external fixation of fractures of the distal radius. ActaOrthopScand 1999;70:116 – 118.
4. Mahan J, Seligson D, Henry S, Hynes P, Dobbins J. Factors in pin tract infection. Orthopaedics 1991;14:305–308.
5. Munson G, Gainor B. Percutaneous pinning of distal radial fractures. J Trauma 1981;21:1032–1036.
6. Aaken JV, Beaulieu JY, Della Santa D, Kibbel, O, Fusetti C. High rate of complications associated with extrafocalKirschner wire pinning for distal radius fractures. Chirurgie de la Main 2008;27: 160 –166.
7. Rafique A, Ghani S, Sadiq M, Siddiqui IA. Kirschner wire pin tract infection rates between percutaneous and buried wires in treating metacarpal and phalangeal

fractures. J Coll Physicians Surg Pak 2006;16:518 –520.

8. Parameswaran D, Roberts C, Voor M. Pin tract infection with contemporary external fixation: how much of a problem? J Orthop Trauma 2003;17:503–507.
9. Stahl S, Schwartz O. Complications of K-wire fixation and dislocations in the hand and wrist. Arch Orthop Trauma Surg 2001;121: 527–530.
10. Egol K, Paksima N, Puopolo S, Klugman J, Hiebert R, Koval K. Treatment of external fixation pins about the wrist: a prospective, randomized trial. J Bone Joint Surg 2006;88A:349 –354.
11. Hsu LP, Schwartz EG, Kalainov DM, Chen F, Makowiec RL. Complications of K-wire fixation in procedures involving the hand and wrist. The Journal of hand surgery. 2011 Apr 1;36(4):610-6.
12. Lethaby A, Temple J, Santy J. Pin site care for preventing infections associated with external bone fixators and pins. Cochrane Database Syst Rev 2008;4:CD004551.