



COMPARISON OF BURIED VS NON BURIED K WIRES FOR TREATMENT OF SUPRACONDYLAR FRACTURE.

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ABSTRACT: Objectives: To compare the frequency of pin tract infection between nonburied and buried K-wires after open reduction internal fixation in supracondylar fracture of humerus in children. **Study Design:** Prospective Cohort Study. **Setting:** Department of Orthopedics Surgery & Traumatology Allied Hospital Faisalabad. **Period:** From June 2014 - June 2017. **Material & Methods:** Patients were selected according to the inclusion criteria. All patients were registered in ER with a history of trauma and having the diagnosis of Supracondylar fracture. Two groups were made; Group A (Buried), Group B (Non-buried). They were followed for the signs of infection. **Results:** Out of 80 cases 45 (56.3 %) were male and 35 (43.8 %) female. In group A (non-buried) there were 40 patients and Mean age was 7.57 ± 2.07 years, pin tract were infected in 8 (20%) patients and there were no pin tract infection in 32 (80%) patients. And in group B (buried) there were 40 patients and mean age was 7.38 ± 2.17 years, Pin tract was infected in 1 (2.5%) patient and there were no pin tract infection in 39 (97.5%). **Conclusion:** Our study showed that rate of infection is significantly reduced in burying of K-wires after open reduction and internal fixation of supracondylar fractures as compared to non-burying technique.

Key words: Children, Humerus, Internal Fixation, Open Reduction, Supracondylar Fracture.

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INTRODUCTION

Supracondylar fracture of the humerus is the second most common fracture in children (16.6%) and is most common injury around the elbow in children comprise (60%) to (75%) of all elbow fractures.¹ This fracture is common in the first decade of life between 5-8 years of age. A fall on an outstretched hand leads to these fractures which are further divided into two types, extension type and flexion type. Extension type is more common (97.7%) than flexion type (2.3%). Extension type is further divided into three types by Gartland. Type I is undisplaced fracture, Type II is displaced with intact posterior cortex, and type III is completely displaced with no contact between the fragments.²

Treatment in children remained a great challenge. These can be one of the most difficult fractures to treat. Various treatment modalities are closed reduction and application of a cast, skin

traction, skeletal traction, closed reduction and percutaneous pinning, and open reduction and internal fixation with K-wires. Complications associated with K-wiring procedure vary minor to life threatening. Pin tract infection is a common and well documented complication (19.69%).³ Which is usually treated with antibiotics and removal of pin. If neglected, it leads to serious complications including osteomyelitis, septic arthritis, early physal fusion, flexor sheath infection and toxic shock syndrome.⁴

A number of strategies have been adopted to reduce the pin tract sepsis. This includes pin site cleaning, release of tethered skin, coating pins with antibacterial substances and application of prophylactic topical antibiotics. However there is very little data available about the burier of wires under the skin reduces the pin tract infection rate as low as 2.27%.^{5,6}

As we do not bury the K-wires in routine, and in nonburied K-wires infection is very common and it may lead to lethal complications and as the burier of K-wires reduce the pin tract infection, but there is very little data available so this demands more research work in this direction. The results of this study may help in tailoring our future management plan thus resulting in a better patient outcome.

MATERIAL & METHODS

Sample Size

By using WHO sample size calculator for 2 proportions.

$$P_1 = 2.27\% \text{ } ^9$$

$$P_2 = 19.69\% \text{ } ^9$$

Power of study = 80%

Level of significance = 5%

Sample size = 80 (40 in each group)

Data Collection Procedure

After the approval of the study from hospital ethical committee informed consent was taken from all the included cases. All the patients fulfilling the inclusion criteria were subjected to the following common treatment. All the patients were randomly divided into 2 groups by using computer generated random number, and were labeled as group A (in which K-wires were left non-buried) and group B (in which K-wires were buried) History was taken from all the included patients of both groups. Complete physical examination was done. Blood test were sent to the hospital laboratory and were reported by Pathologist. X-ray of the fractured elbow was done in radiology department and were elaborated by senior registrar of orthopedic department. The preoperative treatment included stabilization of patient in the form of blood transfusion.

All the cases were operated by senior registrar or above level rank. The fracture site was exposed through medial approach. Ulnar nerve was identified and handled carefully. Fracture fragments were reduced under vision and were fixed with K-wires in cross pattern.

K-wires measuring 1-1.5 mm, in diameter were inserted with power drill. At the end of procedure in group A, K wires were left non buried protruding

through the skin with exposed ends acutely bent, and in group B K-wires were cut off bent and were buried under the skin and were closed with prolene 5/0. Ends of the wires were bent in all cases of both groups to prevent wires migration. Wound was dressed with pyodine dressing and above elbow plaster of Paris posterior slab was applied in both groups. Postoperative check X-ray was done from same hospital radiology department and was elaborated by senior registrar of orthopedic department. Patient was discharged on the next day. Patients were reviewed at 4th week for pin tract infection. Follow up was ensured by taking the telephone numbers of the patients. Stiches were removed at 1 week and posterior slab was removed at 2 week and K-wires were removed at 4 week. At each visit our review assessment was consisting of clinical examination for pin tract infection with minimum of senior registrar opinion on OPD basis. If the pin tract was found infected it was treated according to the modified Openheim classification criteria. Information was collected on a proforma specifically designed for this study and includes demographic details and postoperative result was reported.

RESULTS

There were 80 cases falling in inclusion criteria 40 in group A (non buried) and 40 in group B (buried). All of these patients were admitted in Emergency and Accident department Allied Hospital Faisalabad for supracondylar fracture of humerus in children, and operated by same orthopaedic team. Open Reduction and Internal Fixation (ORIF) with cross K-wires was done with non buried technique in group A and with buried technique in group B. Mean age was 7.47 ± 2.11 years. The range of patient's age was from 4 to 12 years (Table-I). In group A mean age was 7.57 ± 2.07 and in group B mean age was 7.38 ± 2.17 . (Table-II).

There were 45 (56.3 %) male and 35 (43.8 %) female (Table-III)

Pin tract infection measured at 4th week, according to modified Openheim classification and pin tract was considered infected if it is of grade 2 or above, diagnosed on clinical examination the

results are as follows.

In group A (non buried) pin tract were infected in 8 (20%) patients and there were no pin tract infection in 32 (80%) patients. And in group B (buried) Pin tract was infected in 1(2.5%) patient and there were no pin tract infection in 39(97.5%) patients. (Table-IV).

DISCUSSION

In the treatment of type-III fractures the main difficulty of closed reduction and casting is the need to hyperflex the elbow beyond 120° to maintain reduction, which is not always possible due to loss of radial pulse on hyperflexion. Failure to do so increases the risk of losing reduction, due to loss of supporting effect of the triceps muscle. Due to this reason Gartland Type III supracondylar fractures in children should be managed by surgical option. The aim of surgical treatment is to focus on the accurate, stable reduction and fixation of fracture to prevent any axial rotation and coronal or sagittal tilt and hence evade postoperative deformity like loss of

carrying angle and loss of range of motion.

Closed reduction and percutaneous pinning under fluoroscopic guidance is now the accepted standard treatment for displaced supracondylar fractures of the humerus. Many surgeons advocate closed reduction of type III fractures under image intensifier and percutaneous pinning with wires.⁷ But in majority of hospitals in Pakistan, there is non-availability of image intensifier that’s why supracondylar fractures are managed by other methods like side arm traction and open reduction and internal fixation with wires. Sidearm traction requires prolonged stay in hospital as well as keeping the child in lying down position in bed, which is a difficult task for parents and hospital personnel.

The side arm traction also have disadvantage of pin tract infection, loosening of pin and ulnar nerve injury during pin insertion.

	n	Minimum	Maximum	Mean	Std. Deviation
Age	80	4	12	7.47	2.1

Table-I. Descriptive statistics of age.

Group	n	Minimum	Maximum	Mean	Std. Deviation
Non bruid AGE	40	4	12	7.57	2.07
Buired AGE	40	4	12	7.38	2.17

Table-II. Distribution of statistics of age in both groups.

	Frequency	Percent
Male	45	56.3
Female	35	43.8
Total	80	100.0

Table-III. Sex distribution.

		Group		Total
		Non Buried	Buried	
Pin Tract Infection	Yes	8	1	9
		20.0%	2.5%	11.3%
	No	32	39	71
		80.0%	97.5%	88.8%
Total	40	40	80	

Table-IV. Distribution of infection.

There are different approaches used for internal fixation of supracondylar fractures. A lateral, medial, anterior or even posterior approach can be used.⁸ But we used medial approach preferably because in this approach ulnar nerve can be exposed easily before insertion of pins to fix the fracture. Hence ulnar nerve injury can be minimized through this approach.

In this study infection was measured clinically using modified Oppenheim criteria. There were 56.3% males and 43.8% female's cases. These findings are in accordance to the study results conducted by Ahmed A and colleagues where infection rate was 19.69% in non buried and 2.27% in buried technique.⁹ Whereas in our study infection rate was 20.0% in non buried method and 2.5% in buried method.

These results found to be comparable with local and some international studies. Blount et al^{10,11} reported 10 cases of infection in their retrospective review of Kirschner wire complications in 137 patients, two of which caused osteomyelitis. Lee et al¹² observed 30 patients (18.98%) with unsatisfactory results in a review of 158 Gartland type-III supracondylar fracture of humerus in children. Infection rate in our study is 20.0% in percutaneous group which is similar to the above mentioned study. Cramer et al, in another showed the infection rate of 18.75 % with non-buried and 1.6 % with buried wires.¹³ France et al in his study had a rate of infection 10.11% with open and 1.9% with buried wires¹⁴ Various other studies available proved the higher rates of infection with non-buried and lower rates infection with buried techniques.^{15,16,17,18}

Open reduction and internal fixation of supracondylar fracture of humerus in children with buried method is better than with nonburied method, as pin tract infection is significantly lower in buried method.

CONCLUSION

Open reduction and internal fixation of supracondylar fracture in children with buried K wires method is better than the method of non-

buried K wires as it results in significant lower rate of infection.

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