

## ORIGINAL RESEARCH

# Comparison Of Orif With Ccs And K Wire For Lateral Condyle Fractures In Children

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### ABSTRACT

**Aim:** The study's objective was to evaluate the effectiveness of Kirschner wires (K-wire) and cannulated cancellous screws (CC) for internal fixation of paediatric patients with displaced lateral humeral condyle fractures.

**Materials and Methods:** The study comprised 46 individuals with a displaced lateral condyle fracture of the humerus. Open reduction and internal fixation were used to treat the patients using two K-wires or 4mm CC screw. Clinical outcomes were assessed using Hardacre et al. criteria, and fractures were categorised using Milch classification.

**Results:** Each group contained 23 patients, with a mean age of 6.57 years (range 2 to 12 years). Compared to Milch type I (n=12), Milch type II was more prevalent (n=34). The average time for fracture union was 4.13 weeks for the CC screw group and 4.61 weeks for the K-wire group. P value equals 0.026. K-wires and CC screws were typically removed at 4.57 weeks and 13.57 weeks, respectively. The average follow-up for the K-wire group was 12.52 months, compared to 13.83 months for the CC screw. In the K-wire group, three patients (6.5%) had superficial pin site infection, two patients (4.3%) had lateral condyle prominence, and only one patient (2.2%) had lateral condyle prominence in the CC screw group.

**Conclusion:** For displaced lateral condyle fractures of the humerus, open reduction and internal fixation with K-wires or cannulated cancellous screws are both effective treatment options. However, screw fixation offers absolute stability at the fracture site, improving fracture healing, lowering the risk of lateral prominence, and enabling early range of motion and activity in the affected elbow.

**Key words:** Lateral condyle; Humerus; Children; K-wires; Cannulated screw fixation

### INTRODUCTION

The second most frequent injury around the elbow, which accounts for 20% of all elbow fractures in children, is a lateral condyle fracture of the distal humerus. [1-3] The lateral condyle fracture typically affects people six years of age or younger. [4-6] There are numerous classification schemes for humeral lateral condyle fractures. Milch divided them into two categories: Milch type I injury, where the fracture line exits at the radio-capitellar groove and Milch type II injury, where the fracture line exits medial to the capitulo-trochlear

groove. Type II fractures include olecranon and upper segment of radial angulation and lateral translation. [2, 7]

For undisplaced or minimally displaced fractures, non-operative care with plaster cast immobilisation is one of the therapeutic choices for lateral condyle fractures. While fractures with a displacement of more than 2 mm require surgical intervention. To achieve and preserve articular congruity is the goal of treatment for displaced fractures. [8,9] The reduction strategy used during surgical management may be open, closed, or even arthroscopic aided. However, it is widely agreed that open reduction should be used to treat displaced fractures in order to attain close anatomical alignment. [10-13]

The most often utilised metallic implants for fixing fractures are smooth Kirschner wires (K-wire). [8,14] However, this fixation necessitates an additional four to six week period of immobilisation with a plaster splint or cast. Cannulated cancellous (CC) screws are recommended for fracture fixation in a few recently published publications because they produce compression at the fracture site and are a more stable construction. Additionally, it shortens the time before union and doesn't cause any major complications. [10,15-17] However, there aren't many studies contrasting K-wire fixation with cannulated cancellous screws in paediatric displaced lateral condyle fractures of the humerus. In order to assess the clinical results of cannulated cancellous screws and K-wire fixation in children with a displaced lateral condyle fracture of the humerus.

## **MATERIALS AND METHODS**

A prospective study for children referred to the department of orthopaedic, GMC, Jammu with displaced lateral condyle fractures of the humerus was carried out between during June 2019-2022. Using a table of random numbers, patients were split into two groups and fixed with either K-wire or CC screws using an opaque sealed envelope technique. Patients received open reduction and internal fixation using two K-wires or a 4 mm cannulated cancellous (CC) screw. Children aged up to 14 who had healed fractures with displacements greater than 2 mm and fractures occurring less than two weeks after the initial injury were included. Patients with open fractures, further injuries in the same elbow that were related, and anatomically deformed elbows were eliminated. On the basis of the Milch classification, fractures were categorised using pre-operative X-rays. All patients and their parents or legal guardians gave their informed permission. Under general anaesthesia, the elbow was operated on using a lateral approach. The treatment of the periosteum and soft tissues was done with extreme care. K-wire or a cannulated cancellous screw was used to fix the fracture after open reduction.

The K-wires were placed under sterile dressing after being introduced through the skin. For 4 weeks for fractures treated with K-wires and 2 weeks for those set with screws, an upper elbow plaster splint was used to further immobilise the fracture. Sutures were removed after two weeks. The K-wires and the posterior splint were removed as an outpatient operation without anaesthetic when fracture union was visible in the follow-up radiographs, and the patient was then instructed to perform elbow range-of-motion exercises. In two weeks, the splint was taken off of the patient who had a screw fixation, and activities to increase elbow range of motion were begun. After 12 weeks and under general anaesthesia in the operating room, the screws were removed after the fracture union was visible on radiography.

Following up with the patients occurred at 2, 4, 8, 12 weeks, 6 months, and a year. Clinical examinations were conducted to determine neurological condition, deformity, range of motion, and any other problems. Post-operative X-rays were assessed for fracture union, non-union, malunion, and lateral prominence. Statistic evaluation The Fischer's exact test and the Pearson chi-square test were used for the statistical analysis. Statistics were deemed significant at  $p < 0.05$ .

## RESULTS

The study included a total of 50 patients with displaced lateral condyle fractures of the humerus. The CC screw group had 24 examples, while the K-wire group had 26. Three patients in the K-wire group and one patient in the CC screw group were not found until the last follow-up and were therefore omitted from the research. In each group, 23 patients underwent open reduction and fixation using either two K-wires or cannulated cancellous screw. The study included a total of 34 males and 12 females, with a mean age of 6.57 years and a range of 2 to 12 years. We had a total of 24 fractures on the right side and 22 on the left. Milch II was more prevalent than Milch I (n=12) in the Milch classification (n=34) (Table 1).

**Table 1: Demography of the patients**

Parameters	Fracture Fixation with CC screw	Fracture Fixation with K-wire
No. of Patients	23	23
Male	15	19
Female	8	4
Mean Age (years)	6.26	6.87
Right Side	15	9
Left Side	8	4
Milch I	7	5
Milch II	16	18

The average time for fracture union was 4.13 weeks for the CC screw group and 4.61 weeks for the K-wire group. Between the two groups, a statistically significant difference was discovered ( $p$  value = 0.026). K-wires were removed on average at 4.57 weeks and CC screws on average at 13.37 weeks (range: 12–14 weeks). In the CC screw and K-wire groups, respectively, the mean follow-up was 13.83 months (range: 11–16 months) and 12.52 months (range: 10-15 months) (Table 2).

**Table 2: Outcome of treatment**

Parameters	Fracture Fixation with CC screw	Fracture Fixation with K-wire
Union (weeks)	4.13	4.61
Implant Removal (weeks)	13.57	4.57
Average Follow up (months)	13.83	12.52

In the CC screw group, there were no further problems other than one lateral condyle prominence (2.2%). In the K-wire group, 2 patients (4.3%) had lateral condyle prominence, and 3 patients (6.5%) experienced a superficial pin site infection that was treated with oral antibiotics and local wound care. According to the Hardacre et al [18] criteria, the clinical outcome in the CC screw group was excellent in 20 (87%) patients and good in 3 (13%) patients at the final follow-up, compared to 13 (56.5%) excellent and 10 (43.5%) good results in the K-wire group. This difference between the two groups was statistically significant ( $p$  value = 0.022).

## DISCUSSION

Although some studies have shown some encouraging results with close reduction and percutaneous fixation for mildly displaced fractures, open reduction and internal fixation is still the most common treatment for displaced lateral condyle humeral fractures in children. [7,12,15,19] K-wires are the most often utilised implants for internal fixation, but cannulated cancellous screws are now also used to stabilise fractures. [9,10] According to several

studies, open reduction and K-wire fixation should be followed by 6–8 weeks of elbow immobilisation. [2,7,8]

In our study, the elbow was immobilised with an above elbow posterior plaster slab until the fracture union was radiologically confirmed at an average of 4.61 weeks in the group fixed with K-wire, whereas the slab was kept only for two weeks in the CC screw group, and the fracture union was observed at 4.13 weeks. Even better, a single partially threaded cancellous screw allows for early elbow range of motion, early fracture healing, and perfect stability. [1,9,10,13]

The CC screws are often hidden under the skin, while the K-wires are typically left sticking out from the skin for easier removal. Infection of the skin is therefore more likely with K-wires. It's also crucial to determine the ideal moment to remove implants. The implants are often only taken out once the fracture has radiographically united. Therefore, 3 to 8 weeks after union, the K-wire is removed, and 3 to 4 months later, the CC screw. [2,7,9,10,20] According to our findings, the K-wire was taken out on average after 4.57 weeks and the CC screw after 13.37 weeks. The CC screw had to be removed under anaesthesia in the operating room, which raised the expense of therapy. K-wires could be removed as an outpatient procedure even without local anaesthetic.

One of the most frequent problems of surgically treating the lateral condyle of the humerus repaired with K-wires is superficial skin infection, which was also noted in 3 (6.5%) of our cases who had K-wire fixation. Oral antibiotics and local wound care were used in the management of all cases. Similar complications were documented in other investigations and treated appropriately as well. [8,12,19,21]

The lateral prominence or lateral spurring, which is a separate radiological feature that is rarely symptomatic, is one of the major significant consequences following open reduction and internal fixation of lateral condyle fracture. The amount of periosteal dissection performed, the stability of the fracture fixation, and the degree of initial fracture displacement all affect how the lateral spur develops. [2,8-10] According to Wen et al. [10], lateral prominence developed in 36.7% of K-wire fixed patients and 12.5% of CC screw fixed patients. In our analysis, there were two patients (4.4%) fixed with K-wires and one patient (2.2%) repaired with a CC screw who both had lateral prominence. The Hardacre et al. [18] criteria were used to conduct the final evaluation. In the CC screw group, we had 20 (87%) outstanding outcomes and 3 (13%) good results, while in the K-wire group, we had 13 (56.5%) excellent results and 10 (43.5%) good results, which is comparable to other research. [2,7,10,11]

## CONCLUSION

When treating displaced lateral condyle fractures of the humerus in children, K-wires or cannulated cancellous screw may be used for internal fixation in addition to open reduction. The K-wires are simple, inexpensive, and easy to use. It requires extended immobilisation and there is a chance of skin infection. Even though screw fixation necessitates a second procedure to remove the screws, it offers complete stability at the fracture site, improving fracture healing, decreasing the likelihood of lateral prominence, and allowing early range of motion and activity in the afflicted elbow.

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