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ORIGINAL ARTICLE

Efficacy of Closed Reduction Perutaneous Pinning and Laeral Pinning in the Treatment of Supracndylar Fracture of Humerus in Children

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ABSTRACT

Objective: Closed reduction percutaneous cross pinning vs. lateral pinning in the treatment of children's supracondylar humeral fractures is the goal of this research.

Study Design: Prospective study

Place and Duration: THQ hospital Jaranwala/ Punjab medical college Faisalabad. Feb 2021-Aug 2021

Methods: This research included a total of 90 patients of both sexes. After obtaining informed permission, demographic information such as gender, age, and BMI was gathered. Patients ranging in age from 2 to 15 years old were taken into consideration for treatment. Two groups of children with fractures of the supracondylar humerus were recruited and randomized. In the first group, 45 patients got percutaneous cross pinning, whereas in the second group, 45 patients had lateral pinning performed on them. Both groups' radiological and functional outcomes were evaluated using Flynn's criteria, and a high incidence of problems was noted. SPSS 24.0 was used to analyze all of the data.

Results: Total 60 (66.7%) patients were males and 30 (33.3%) cases were females. There was no any significant difference of age among both groups. Most common cause of fracture was sports and road traffic accident. In group I mean surgical time was 28.12±4.04 minutes and mean time in group II was 32.21±4.31 minutes. We found mean radiation time in group I was greater 4.11±5.41 sec than in group II radiation time was 3.21±4.5 sec. According to Flynn's criteria, excellent results were found in 29 (64.4 %) cases, good results were found in 10 (22.2 %), and fair results were found in 6 (13.3 %) cases in group I, while excellent results were found in 24 (53.3 %) cases, good results were found in 13 (28.9 %), and fair results were found in 8 (17.8%) cases in group II.

Conclusion: After conducting this study, we came to the conclusion that both methods for the treatment of closed reduction supracondyla fractures of the humerus are safe and effective for children; however, percutaneous pining was found to be less operative and required more radiation time than two lateral pinnings.

Keywords: Two lateral pinning, Children, Supracondylar humerus fracture, Percutaneous cross pinning

INTRODUCTION

When it comes to elbow fractures in children, the humeral supracondylar fracture is the most common, accounting for 55% to 75% of all elbow fractures in children. [3] For the time being, we have created an algorithm for normalised fracture treatment. For non-displaced fractures, it recommends non-surgical immobilisation, but for displaced fractures, it recommends closed reduction with percutaneous pinning.

It is common for falls to result in an extension-type supracondylar fracture because of the axial force being transferred to bending force at this site, which causes the elbow to hyperextend. A hyperextension of the elbow occurs when falls cause the olecranon to receive most of their force at the humeral supracondylar. Supracondylar fractures that occur in this manner are known as "flexion fractures" because the elbow is bent at the time of the fall. Supracondylar humeral fracture (SCHF) has been found in 98 percent of Chinese children with an extension-type fracture [7].

Supracondylar humeral fracture is the outcome of a long-term hand fall with the elbow.[8] Most of the extension kinds have had the distal fragment dislodged, whereas just around 5 percent have had it dislodged throughout this time period, Non-displaced fractures (type I), partially displaced fractures with intact reverse cortex (type II), and entirely displaced fractures (type III) are all categorised according to the criteria of Gartland[9] (type III). Therapy for Type III fractures may be hampered by malunion, stiffness of the colebow joint, iatrogenic neurovascular injury (including compartment syndrome), and malunion of the fracture.[10]

The course of therapy is dictated by the current exchange rate. Reduce the frequency of open fractures, vascular compromises, and irreducible fractures via open means alone [11,12] Other treatment options include flexion and extension handling and casting, traction, percutaneous pinching with the Kirschner wires, open and integrated reduction, as well as these aforementioned alternatives as well. For the majority of patients, closed reduction and percutaneous pinning are the most common treatments. An immediate course of treatment was necessary to prevent vascular compromise and compartmental syndrome. Writings on percutaneous pin insertion differ in their recommendations. [13] Surgeons are forced to intervene because of the inherent instability, difficulties reducing it, and the risk of losing mobility owing to a larger elbow length. [14]

Percutaneous cross pins and two lateral pins for the closure decreasing supracondylar fracture in children are the primary treatment options in this research.

MATERIAL AND METHODS

This Prospective study was conducted at THQ hospital Jaranwala/ Punjab medical college Faisalabad and consists of 90 patients. After obtaining informed permission, we collected demographic data on each patient, including their age, gender, and height/weight. Open fractures, patients who were unsuited for anaesthesia, and those who previously fractured the same elbow were all exclusions from this research.

All patients were between the ages of 2 and 15. Two groups of children were formed, each with an equal number of participants. In the first group, 45 patients had percutaneous cross pinning, whereas in the second group, 45 patients had lateral pinning performed. Suspected supracondylar elbow fracture patients were assessed for their vascular and neurological status. It was necessary to obtain X-rays from each of the three sides of the patient's head. The damaged elbow was immobilised in an above-elbow splint at 30°–45° of flexion and limb elevation in all displaced supracondylar fractures. Viable limbs with no pulse [no radial pulse due to full transaction, an intimal tear or compression of the brachial artery, but the hand is still viable due to excellent collaterals at the elbow] were also included in this research. The study was conducted on these limbs. Radial pulsation developed following close reduction and pinning in all of these patients, despite the presence of a vascular surgeon.. During induction and postoperatively, a single dose of parenteral cefuroxime was

administered and oral cefuroxmime was administered for three days after discharge. The elbow was flexed to 90 degrees in a well-padded posterior splint after surgery. There was an investigation into any patients who had an immediate postoperative ulnar nerve impairment, and the pin was relocated. Immediately after surgery, radiographs were performed on all patients to ensure that the reduction had been maintained. Neurovascular deficit was monitored often on the operative limb, which was increased.

Both groups' radiological and functional outcomes were evaluated using Flynn's criteria, and a high incidence of problems was noted. The frequency and percentage of categorical variables were measured, while the standard deviation of descriptive variables was estimated. SPSS 24.0 was used to analyse all of the data.

RESULTS

Total 60 (66.7%) patients were males and 30 (33.3%) cases were females. There was no any significant difference of age among both groups. Most common cause of fracture was sports and road traffic accident.(table 1)

Table 1: Demographics details of enrolled cases

Variable	Percutaneous cross pinning	Two Lateral Pining
Mean age (years)	7.8±5.56	7.03±6.76
Gender		
Male	30 (66.7%)	30 (66.7%)
Female	15 (33.3%)	15 (33.3%)
Cause of fracture		
RTA	18 (40%)	21 (46.7%)
Sports	19 (42.2%)	20 (44.4%)
Fall	8 (17.8%)	4 (8.9%)

In group I mean surgical time was 28.12±4.04 minutes and mean time in group II was 32.21±4.31 minutes. We found mean radiation time in group I was greater 4.11±5.41 sec than in group II radiation time was 3.21±4.5 sec. We found most common fracture side was left elbow. (table 2)

Table 2: Comparison of operative and radiation of time among both groups with effected sides

Variable	Percutaneous cross pinning	Two Lateral Pining
Mean operative time (min)	28.12±4.04	32.21±4.31
Mean Radiation time (sec)	4.11±5.41	3.21±4.5
Fracture side		
Left	31 (68.9%)	32 (71.1%)
Right	14 (31.1%)	13 (29.9%)

According to Flynn's criteria, excellent results were found in 29 (64.4 %) cases, good results were found in 10 (22.2 %), and fair results were found in 6 (13.3 %) cases in group I, while excellent results were found in 24 (53.3 %) cases, good results were found in 13 (28.9 %), and fair results were found in 8 (17.8%) cases in group II. (Table 3)

Table 3: Comparison of outcomes by Flynn's criteria

Flynn's Outcomes	Percutaneous cross pinning	Two Lateral Pining
Excellent	29 (64.4 %)	24 (53.3 %)
Good	10 (22.2 %),	13 (28.9 %),
Fair	6 (13.3 %)	8 (17.8%)
Total	45 (100 %)	45 (100%)

We found complications in group II was greater than that of group I.(fig1)

Among group I patients, the most frequent complication was superficial infection, whereas among group II patients, the most common event was ulnar nerve neuropraxia. (table 4)

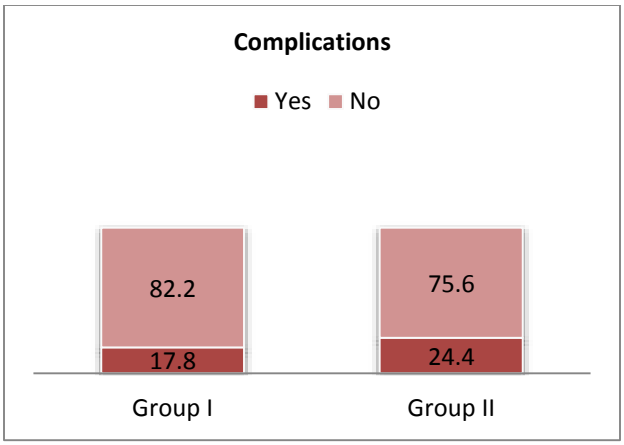

Figure 1: Post-operatively comparison of complications among both groups

Complications	Percutaneous cross pinning	Two Lateral Pining
Superficial infection	4 (8.9%)	3 (6.7%)
pin loosening	2 (4.4%)	3 (6.7%)
nerve neuropraxia	2 (4.4%)	5 (11.1%)
Total	8 (17.8%)	11 (24.4%)

DISCUSSION

It has long been known that supracondylar humerus fractures in children are among of the most frequent and most difficult fractures to treat. The treatment's primary aims are decrease of organ size and internal fixation. All patients should be thoroughly examined and evaluated at the first assessment. These injuries were traditionally treated with closed reduction and K-wire fixation. Convenience, cheaper expenses, and fewer hospitalizations are all advantages of K-wires [15,16].

A total of ninety patients ranging in age from two to fifteen years old were present. 6.7 percent of patients were male, with the remaining 33.3 percent being female. According to our findings, the average age was 7.8±5.56 years. The results of this study were equivalent to those of the prior investigations. [17,18] The most prevalent causes of fractures were sports-related injuries and car accidents. [19,20] Debate has erupted about whether or not it's safe to pin the ulnar nerve with only the lateral k-wire because of the risk of ulnar nerve damage from the medial k-wire during percutaneous cross-pinning, as well as the potential for biomechanical instability. [21,22]

In group I mean surgical time was 28.12±4.04 minutes and mean time in group II was 32.21±4.31 minutes. We found mean radiation time in group I was greater 4.11±5.41 sec than in group II radiation time was 3.21±4.5 sec. We found most common fracture side was left elbow [23] Excellent results were found in 29 (64.4 percent) cases, good results were found in 10 (22.2 percent), and fair results were found in six (13.3 percent) cases in group I, while excellent results were found 24 (53.3 percent) cases, good results were found in 13 (28.9 percent), and fair results were found in eight (17.8%) cases in group II. Statistically, there was no difference in the outcomes between the two groups that were tested. Previous research revealed that both cross pinning and the use of the two-lateral pinning approach were safe and effective ways to treat patients. [24,25] In cross-sectional case pinning, Sudheendra et al. [26] produced 82 percent good results and 18 percent good results, while in lateral case pinning, they achieved 71 percent excellent results and 29 percent good results. In their research, Ario et al.[27] discovered that 69.3 percent had excellent results, 15.3 percent had good outcomes, 14.8 percent had fair outcomes, and 0.5 percent had terrible outcomes, with the remaining 0.5 percent showing negative outcomes. In their trial, Raffic et al.[28] showed that 72 percent of the findings were

favourable and 28 percent of the results were excellent lateral outcomes.

Patients with fractures far away from the olecranon or on the medial side of the arm were found to be unstable with two lateral pin insertions [29]. However, stability was established with an extra lateral pin in 27% of patients. Additional medial pinning, they said, might give total stability for this kind of fracture.. There has been a comparison of patients who have had cross-pinning and patients who have had lateral pins placed by Reisolu and colleagues [30]. When lateral pins were used, 18.7 percent of the patients experienced reduction loss, whereas 7.6 percent of cross pins had reduction loss. Cross-pinning should be performed on patients with disintegration and instability of the medial colon, say the researchers. Researchers found that medial fragmentation greatly affected fracture stability, and that using two lateral and one medial pins provided the strongest pin arrangement against torsion forces[31].

We found complications in group II were greater than that of group I. Among group I patients, the most frequent complication was superficial infection, whereas among group II patients, the most common event was ulnar nerve neuropraxia. Reduced pin infections were similarly reported by Pirone et al [32], and in the Mostafavi and Spero series[33], with reductions of 5% and 1% in pin tract infections, respectively. The authors conclude that, notwithstanding the possibility of lateral pinching or cross-spinning for the treatment of supercondylar humerus fractures of Gartland types II and III, both techniques were equally safe and effective in both kinds of supracondylar humerus fractures. Lateral pinning was shown to be just as effective as cross pinning in terms of ensuring patient safety.

CONCLUSION

After conducting this study, we came to the conclusion that both methods for the treatment of closed reduction supracondyla fractures of the humerus are safe and effective for children; however, percutaneous pining was found to be less operative and required more radiation time than two lateral pinnings.

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