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**ORIGINAL ARTICLE**

# Supracondylar Fracture of Humerus in Children Treated with Closed Reduction and Percutaneous Cross Pinning VS Lateral Pinning

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## ABSTRACT

**Objective:** The aim of this study is to determine the outcomes between percutaneous cross pinning vs two lateral pinning in treatment of closed reduction supracondylar fracture of humerus in children.

**Study Design:** Prospective study

**Place and Duration:** Study was conducted in Orthopaedic Unit Ayub Medical Teaching Institute Abbottabad and DHQ Teaching Hospital Gomal Medical College Dera Ismail Khan during from October 2019 to May 2020 (09 months duration).

**Methods:** Total 60 patients of both genders were presented in this study. Baseline demographically details of patients age, sex and body mass index were recorded after taking consent. Patients were aged between 2-14 years were included. Children who had supracondylar humerus fractures were enrolled and divided equally into 2-groups. Group I had 30 patients and received percutaneous cross pinning technique and group II had 35 patients underwent for lateral pinning. Radiological and functional results were assessed by Flynn's criteria among both groups, frequency of complications was also observed. Complete date was analyzed by SPSS 22.0 version.

**Results:** Total 36 (60%) were males (18 in each group) and 24 (40%) were females (12 in each group. Mean age of the patients in group I was 6.14±3.12 years and in group II mean age was 5.66±5.28 years. Sports 45 (75%) was the most common cause of fracture followed by traffic accidents 10 (16.67%) and the rest were 5 (8.33%) fall from the height. Mean surgical time in group I was 31.24±2.16 minutes while in group II mean time was 33.42±1.61 minutes. Mean radiation time in group I was 2.01±1.1 sec and in group II radiation time was 1.34±1.1 sec. According flynn's criteria excellent results were found in 20 (66.7%) cases, good results in 8 (26.7%) and fair results found in 2 (6.7%) while in group II excellent results were found in 19 (63.33%), good results in 9 (30%) and fair results in 2 (6.7%). Significantly no any difference in outcomes was observed among both groups.

**Conclusion:** We concluded in this study that the both techniques are safe and effective for the treatment of closed reduction supracondylar fracture of humerus in children but less operative and high radiation time was observed in percutaneous cross pinning as compared to two lateral pinning.

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

## INTRODUCTION

Supracondylar humeral fracture in children younger than 15 years is the most prevalent kind of colibrium fracture[1]. Because of the bending structure and the weak metaphysical sclerotine of the distal humerus, and because of the thin crim of metaphysical bone, children are susceptible to this fracture. Gartland criteria are most usually characterized as a Gartland type I fracture is stable and unpopulated, while Gartland type 2 and III fractures show variable degrees of displacement and angulation [2]. Injurious extension is characterized as unmoved (Type I), partially moved fractures with undamaged posterior hinges (Type II), and fully moved fractures. Injury of the extension (Type III). Wilkins[3] further defined Type III fractures as Gartland IIIA posteromedial and IIIB posterolateral correspondingly based on the coronary displacement.

While general consensus has been reached for Type I and a few Type II divides with cast application, Dunlop or olecranone traction, Type III divides typically need closed reduction and pinning. Complications such as loss of reduction, Compartmental and Maluniotic syndrome are connected with conservatory treatment[4]. Either a medium or a lateral pin in a cross-cut or two lateral pins is the most typical choice[5,6] of pinning. Two lateral pins with increased stability have been shown to be preferable to cross pins [7,8]. Many surgeons, however, believe that this structure raises by two or four times the rate of iatrogenic ulnary nerve injury[9-12].

Certain methods exist during medial stabilization of K-wire to avoid ulnar nerve damage. A mini-open procedure is useful in finding the medial epicondyl. The medial wire shall be placed by extending the elbow and the medial pin may also be supported by the intraoperative pine stimulation at 2 mA. [13,14], the first one. Current injuries include open fractures, fractures with aberrant vascular condition, and notably high-risk dividing syndrome fractures. Open decrease occurs if a suitable reduction by closed manipulation cannot be achieved. Open decrease results in lengthier union time, lowered drastically the elbow's ROM and worse functioning performance. [15]

The aim of this study is to identify results for treatment of closed reduction supracondyla fracture of the humerus in children between percutaneous cross pinning and two lateral pinning.

## MATERIAL AND METHODS

This Prospective study was conducted at Orthopaedic Unit Ayub Medical Teaching Institute Abbottabad and DHQ Teaching Hospital Gomal Medical College Dera Ismail Khan during from October 2019 to May 2020 (09 months duration) and consists of 60 patients. Patients detailed demographics age, sex and body mass index were calculated after taking informed consent. Patients had open fractures, unfit for anaesthesia, previous fracture on the same elbow those did not give written consent were excluded from this study.

Patients were aged between 2-14 years were included. Children who had supracondylar humerus fractures were enrolled and divided equally into 2-groups. Group I had 30 patients and received percutaneous cross pinning technique and group II had 35 patients underwent for lateral pinning. Radiological and functional results were assessed by Flynn's criteria among both groups, frequency of complications was also observed. Categorical variables were assessed by frequency and percentage but descriptive variables were calculated by standard deviation. Complete date was analyzed by SPSS 22.0 version.

## RESULTS

Total 36 (60%) were males (18 in each group) and 24 (40%) were females (12 in each group. Mean age of the patients in group I was 6.14±3.12 years and in group II mean age was 5.66±5.28 years. Sports 45 (75%) was the most common cause of fracture followed by traffic accidents 10 (16.67%) and the rest were 5 (8.33%) fall from the height. (table 1)

Table 1: Baseline details of enrolled cases

| Variable | Group I (n=30) | Group II (n=30 |
|---|---|---|
| Mean age | 6.14±3.12 | 5.66±5.28 |
| Sex | | |
| Male | 18 (30%) | 18 (30%) |
| Female | 12 (20%) | 12 (20%) |
| Cause of fracture | | |
| Sports | 23 (38.33%) | 22 (36.67%) |
| RTA | 5 (8.33%) | 5 (8.33%) |
| Fall from height | 2 (2.33%) | 3 (5%) |

Mean surgical time in group I was 31.24±2.16 minutes while in group II mean time was 33.42±1.61 minutes. Mean radiation time in group I was 2.01±1.1 sec and in group II radiation time was 1.34±1.1 sec. Left side was the most common effected side among both groups, in group I was 21 (70%) and in group II was 19 (63.33%). (table 2)

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

| Variable | Group I | Group II |
|---|---|---|
| Mean operative time (min) | 31.24±2.16 | 33.42±1.61 |
| Mean Radiation time (sec) | 2.01±1.1 | 1.34±1.1 |
| Effected Side | | |
| Left | 21 (70%) | 19 (63.33%) |
| Right | 9 (30%) | 11 (36.67%) |

According flynn's criteria, in group I excellent results were found in 20 (66.7%) cases, good results in 8 (26.7%) and fair results found in 2 (6.7%) while in group II excellent results were found in 19 (63.33%), good results in 9 (30%) and fair results in 2 (6.7%). (Table 3)

Table 3: Post-operatively outcomes according to Flynn's criteria

| Variable | Group I (n=30) | Group II (n=30) |
|---|---|---|
| Excellent | 20 (66.7%) | 19 (63.33%) |
| Good | 8 (26.7%) | 9 (30%) |
| Fair | 2 (6.7%) | 2 (6.7%) |

Superficial infection was the most common complication in group I 3 (10%) followed by pin loosening 2 (6.7%) and ulnar nerve neuropraxia found in 1 (3.33%) but in group II ulnar nerve neuropraxia was the most common complication found in 3 (10%) followed by superficial infection and pin loosening (3.33%). (table 4)

| Complications | Group I (n=30) | Group II (n=30) |
|---|---|---|
| Superficial infection | 3 (10%) | 1 (3.33%) |
| pin loosening | 2 (6.7%) | 1 (3.33%) |
| nerve neuropraxia | 1 (3.33%) | 3 (10%) |

## DISCUSSION

The most prevalent type of elbow fractures in the youngsters is supercondylar fractures of the humerus. It is a broken portion or metaphysis of distal humerus. [16] . Narrow decrease and two percutaneous ones The Kirschner wire fi xation system offers straightforward, safe and cheap treatment for supracondylar fractures of humerus in children. There are two K-wires positioning configurations. One is a lateral pinch, the other a cross pinch. There are many disputes over the optimum method for pin configuration in orthopedic literature.

In current study total 60 patients aged between 2-14 years were included. Majority of the patients 60% were males. We arranged to divide children equally in to 2-groups. Mean age of the patients in group I (cross pinning) was 6.14±3.12 years and in group II (lateral pinning) mean age was 5.66±5.28 years. These findings were comparable to the previous studies.[17,18] Sports was the major cause of fractures was observed in 45 (75%) followed by traffic accidents 10 (16.67%) and the rest were 5 (8.33%) fall from the height.[18,19]

Mean surgical time in group I was 31.24±2.16 minutes while in group II mean time was 33.42±1.61 minutes. Mean radiation time in group I was 2.01±1.1 sec and in group II radiation time was 1.34±1.1 sec.[20,21] In our study, results were assessed according to Flynn's criteria, in group I excellent results were found in 20 (66.7%) cases, good results in 8 (26.7%) and fair results found in 2 (6.7%) while in group II excellent results were found in 19 (63.33%), good results in 9 (30%) and fair results in 2 (6.7%). There was no any significantly difference was observed in outcomes among both groups. These findings relates to the previous some studies in which both cross pinning and two lateral pinning provided effective and safe results.[17,22,23] Sudheendra et al. [24] showed 82% excellent results and 18% good results in cross-section pinning case and 71% excellent results and 29% good results in the lateral pinning case. In their study, Ariño et al.[25] found 69.3% to be excellent, 15.3% to be good, 14.8% to fair and 0.5% to have poor side pinning results. In

their investigation, Raffic et al.[26] observed 72% favorable results and 28% good lateral pinning results.

Superficial infection was the most common complication in group I 3 (10%) followed by pin loosening 2 (6.7%) and ulnar nerve neuropraxia found in 1 (3.33%) but in group II ulnar nerve neuropraxia was the most common complication found in 3 (10%) followed by superficial infection and pin loosening (3.33%) was assess in our study[18]. In the Mostafavi and Spero series[27], there were (5%) and (1%) less pin tract infections than our studies, Pirone et al also presented less pin infections. [28]. We conclude that although fiction of the supracondylar humerus fracture Gartland type II and III may be done by either cross- or lateral pincing, boths methods were comparatively safe and reliable in both the types of supracondylar humerus fractures in children in view of the ulnar nerve injury and extension lag that is more commonly associated with cross-pinning. Therefore, in our investigation, the safety and effectiveness of the lateral pinning and the cross pinning were equally good.

## CONCLUSION

We concluded in this study that the both techniques are safe and effective for the treatment of closed reduction supracondylar fracture of humerus in children but less operative and high radiation time was observed in percutaneous cross pinning as compared to two lateral pinning.

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