

Humerus Supracondylar Fracture in Children Treated with Closed Redution Percutaneous Cross Pinning vs Two Lateral Pinning

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ABSTRACT

Objective: With this research, we hope that we can compare the effectiveness of percutaneous cross pins in treating paediatric supracondylar humerus fractures to that of two-lateral pins.

Study Design: Prospective study

Place and Duration: Children Hospital Faisalabad/ Bahawal Victoria Hospital Bahawalpur. April 2018-Oct 2018.

Methods: This research included 104 patients of both sexes. After permission, the patient's age, sex, and BMI were recorded. The patients ranged in age from 3 to 10. Children with supracondylar humerus fractures were split into two groups. Percutaneous cross pinning was performed on group C patients, whereas two lateral pinning was done on group D patients. We examined the radiological and functional results and the occurrence of problems between the two groups. SPSS 21.0 was used to analyze the data.

Results: In current study surgical time in group C was lower as compared to group D and had higher radiation time with p value <0.003 . Post operatively frequency of excellent results in group C was higher among 35 (67.3%) cases as compared to group D in 27 (51.9%) patients. Frequency of poor results in group D was higher in 5 (9.6%) patients as compared to group C in 1 (1.9%) cases. Complication rate was also higher in group D 12 (23.1%) patients as compared to group C in only 6 (11.5%) cases.

Conclusion: We observed that percutaneous pinning was more advantageous than two lateral pinnings in treating children with closed reduction supracondylar humerus fractures.

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

INTRODUCTION

In youngsters under the age of 15, supracondylar humeral fractures are most prevalent [1]. Younger children are more vulnerable to this fracture because of their body's natural bending nature, as well as the weak metaphyseal bone between the olecranon and coronoid cavities. A Gartland type I fracture is one that is stable and has no displacement, while a Gartland type II or III fracture has displacement and angulation in variable degrees [2].

This form of fracture occurs when the olecranon, which is extended, absorbs the majority of axial energy and is turned into bending force at the humeral supracondylar area, which results in the hyperextensive elbow. The flexion-type supracondylar fracture occurs when the olecranon is struck when the elbow is flexed. In Chinese children, 98% of supracondylar humeral fractures (SCHF) are extension-type fractures, according to a study [3]. Fracture segments of Gartland type I can be stabilised via cast fixing. [4] For significantly displaced Gartland type II and III fractures, no consensus has been obtained on the pinning technique or configuration following closed reduction [5]. There are two prevalent methods of pin fixation: lateral entry pins solely, and crossed entry pins with at least one medial and one lateral [6]. Crossed entry pins theoretically offer the benefit of increased mechanical stability, but this approach increases the risk of ulnar nerve damage [7, 8]. Although ulnar nerve damage may be avoided, lateral entrance pins may diminish the structure's mechanical stability [9, 10].

Supracondylar fractures of the humerus account for 60% of all elbow joint fractures in children between the ages of 4 and 7.

[11] Two of the most common side effects of percutaneous pinning include ulnar nerve palsy and the development of cubitus varus/valgus or hyperextension deformity. Numerous studies are being conducted to determine the best pin shape for fracture stabilisation, reducing the risk of neurovascular damage, and promoting correct fracture reduction and union. [12]

Percutaneous crosspins 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 Children Hospital Faisalabad/ Bahawal Victoria Hospital Bahawalpur and consists of 104 patients. Informed consent was obtained before calculating the demographics of the patients, including age, sex, and BMI. There were a few exclusions from this research, including open fractures, individuals who were unsuited for anaesthesia, and those who had previously fractured their elbow.

Patients with ages ranging from 3 to 10 years were included. Children who had sustained supracondylar humerus fractures were recruited and separated into two groups based on their age. Group C consisted of 52 patients who got percutaneous cross pinning method, whereas group II consisted of 52 patients who underwent lateral pinning technique. Flynn's criteria were used to evaluate the radiological and functional outcomes in both groups, and the incidence of complications was also noted in both groups. Descriptive variables were computed using standard deviation, whereas categorical variables were examined using frequency and percentage counts, respectively. The SPSS 21.0 version was used to examine the entire data set.

RESULTS

Among 104 patients, there were 70 (67.3%) male patients and 34 (32.7%) were females. (fig 1)

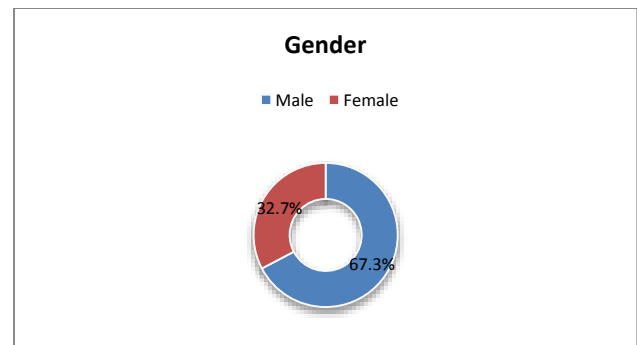


Figure-1: Over all gender distribution

We found that games play in sports ground was the most common cause of fractures found in 65 (62.5%) cases followed by road traffic accidents in 25 (24.03%) and frequency of fallen from height was 14 (13.5%) cases.(fig 2)

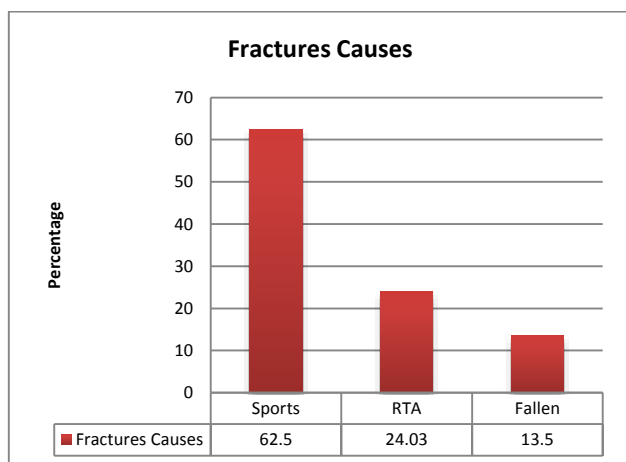


Figure-2: Distribution of patients because of fracture causes

In group C mean age of the patients was 4.8 ± 5.31 years and in group D mean age was 5.5 ± 4.42 years. Mostly effected side of the patients was left. Mean surgical time in group C was lower as compared to group D and had higher radiation time with p value < 0.003 .(table 1)

Tabl-1: Baseline operative details

Variable	Group C	Group D
Mean age years	4.8 ± 5.31	5.5 ± 4.42
Mean operative time (min)	29.13 ± 9.13	35.1 ± 7.35
Mean Radiation time (sec)	4.5 ± 3.38	2.45 ± 9.35
Side of fracture		
Left	37 (71.2%)	31 (59.6%)
Right	15 (28.8%)	21 (40.4%)

Post operatively frequency of excellent results in group C was higher among 35 (67.3%) cases as compared to group D in 27 (51.9%) patients. Frequency of poor results in group D was higher in 5 (9.6%) patients as compared to group C in 1 (1.9%) cases. (Table 2)

Table-2: Outcomes among both groups by Flynn's criteria

Variable	Group C	Group D
Excellent	35 (67.3%)	27 (51.9%)
Good	16 (30.8%)	20 (38.5%)
Poor	1 (1.9%)	5 (9.6%)

Complication rate was also higher in group D 12 (23.1%) patients as compared to group C in only 6 (11.5%) cases. Among 12 cases of group D nerve neuropraxia was the most common and in group C superficial infection was mostly found. (table 3)

Table-3: Complication rate among both groups

Complications	Group C	Group D
Superficial infection	3 (5.8%)	3 (5.8%)
pin loosening	2 (3.8%)	3 (5.8%)
nerve neuropraxia	1 (1.9%)	6 (11.5%)

DISCUSSION

The incidence of supracondylar humerus fractures is 60-71/100000. About 16 percent of these fractures need surgical intervention, whereas the majority of them may be managed with conservative methods.[13] Approximately 17% of supracondylar humerus fractures [14] are Gartland type 3 fractures. Percutaneous fixation with cross-pinning is used to repair these

fractures following closure reduction [15]. Percutaneous cross-pinning has been controversial because of concerns about ulnar nerve injury and biomechanical stability [16].

In current study 104 patients of both genders were presented. Among 104 patients, there were 70 (67.3%) male patients and 34 (32.7%) were females. We found that games play in sports ground was the most common cause of fractures found in 65 (62.5%) cases followed by road traffic accidents in 25 (24.03%) and frequency of fallen from height was 14 (13.5%) cases. These were comparable to the previous studies.[17,18] In group C mean age of the patients was 4.8 ± 5.31 years and in group D mean age was 5.5 ± 4.42 years. Mostly effected side of the patients was left. Mean surgical time in group C was lower as compared to group D and had higher radiation time with p value < 0.003 .[19,20] For the stabilisation of humerus supracondylar fractures, the percutaneous pinning configuration might be one medial and lateral cross-pin, two lateral pins only, two lateral and one medial pins, or three lateral pins. Despite the fact that biomechanical studies suggest the cross-pin to be better [21], clinical investigations have found no such advantage [22]. The stability of two lateral pins was not reached by Aslani et al. for fractures beyond the olecranon fossa or in the medial arm, while the stability of a third pin from the lateral was accomplished by 27% of patients [23]. They claimed that with further medial pinning, this sort of fracture may give total stability. A study by Reisolu and colleagues [24] evaluated the outcomes of patients who had cross-pinning vs lateral pinning. 20% of patients who received cross-pins lost their reduction, whereas only 7.6% of those who had the lateral pinning procedure lost it. Cross-pinning was recommended for individuals with medial colon disintegration and instability, according to the study's authors. According to Larson et al., medial fragmentation considerably decreased fracture stability and that the most stable pin arrangement against torsion forces may be attained by putting two lateral and one medial pins [25].

Post operatively frequency of excellent results in group C was higher among 35 (67.3%) cases as compared to group D in 27 (51.9%) patients. Frequency of poor results in group D was higher in 5 (9.6%) patients as compared to group C in 1 (1.9%) cases. Cross-pinning and two-lateral pinning have both been shown to be safe and effective in previous studies. [17-19] In cross-sectional case pinning, Sudheendra et al. [26] had 82% good results and 18% good results, whereas in lateral case pinning, they had 71% good results and 29% good results. A research by Ario et al.[27] found that 69.3% of the results were good, 15.3% of the outcomes were good, and 14.8% of the outcomes were fair. In their trial, Raffic et al.[28] found 72% favourable findings and 28% good lateral outcomes.

Complication rate was also higher in group D 12 (23.1%) patients as compared to group C in only 6 (11.5%) cases. Among 12 cases of group D nerve neuropraxia was the most common and in group C superficial infection was mostly found. Pin infections were found to be 5 percent and 1 percent lower in the Mostafavi and Spero series[30] than in our trials, as well as Pirone et al [29]. In the light of ulnar-nerve damage and extension lag, which is more usually linked with cross-spinning for minors, we conclude that both procedures were fairly safe and confident in both kinds of supracondylar humerus fractures. According to our findings, lateral pins were just as safe and effective as cross pins in our study. As shown with the ulnar nerve after medial pinning [31], the risk of complications can be lowered by decreasing elbow flexion. Brauer et al. found that 4.1% of patients who had cross-pinning with k-wire were found to have ulnar nerve injury in a meta-analysis of 1158 individuals [32].

CONCLUSION

We observed that percutaneous pinning was more advantageous than two lateral pinnings in treating children with closed reduction supracondylar humerus fractures.

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