OBJECTIVE: To determine the outcome of open reduction and cross k-wires fixation in supracondylar fractures of humerus in terms of functional and cosmetic outcome by using Flynn's grading system.

STUDY DESIGN: This was a descriptive and cross-sectional study.

PATIENTS & METHOD: A sample of sixty consecutive patients with displaced supracondylar fracture of humerus (Gartland Type II & III) assessed on anteroposterior and lateral radiograph between ages of 2 to 12 years (both sex) were included in this study from Orthopedic Department, Services Hospital Lahore. This was a follow-up study.

RESULTS: The mean age was 7.7 years, the youngest patient being 2 years of age and the oldest 12 years. Functional outcome for 46 (76.7%) patients was excellent, 10 (10%) patients was good, 03 (5 %) patients was fair and 1 (1.7%) patient was poor. Cosmetic outcome of 47 (78.3%) patients was excellent, 09 (15%) patients was good, 03 (5%) patients was fair and 01 (1.7%) patient was poor.

CONCLUSION: Open reduction and internal fixation with cross k-wires is a good and safe method of treatment in displaced supracondylar fractures of humerus in children.

KEY WORDS: Displaced supracondylar fractures of humerus, Flynn's grading system.

INTRODUCTION

Supracondylar fracture of the humerus is the second most common fracture in children and the most common fracture in children under 7 years of age. It accounts for 50–70% of all elbow fractures. The typical mechanism is a fall on an outstretched hand that puts a hyperextension load on the arm. The distal fragment displaces posteriorly in over 95% of cases. As the elbow is forced into hyperextension, the olecranon serves as a fulcrum and focuses the stress on the distal humerus causing fracture. The rare flexion-type supracondylar fracture is often the result of a fall directly onto the flexed elbow. All injuries are classified in Table 1.

Table 1: Classification of supracondylar humerus fractures in children.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>Un-displaced</td>
</tr>
<tr>
<td>II</td>
<td>Displaced with intact posterior cortex</td>
</tr>
<tr>
<td>III</td>
<td>Completely displaced</td>
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Correspondence to:
Dr. Naveed Ishaq Malik
CHM, Lahore, Pakistan
Email: malik_ni@yahoo.com

PATIENTS & METHOD

In this follow-up study a sample of sixty consecutive patients with displaced supracondylar fracture of humerus (Gartland Type II & III) assessed on anteroposterior and lateral radiograph between ages of 2 to 12 years (both sex) were included in this study.
Procedure was done under general anesthesia. Pneumatic tourniquet was applied. Proper draping was done. Incision was made by lateral approach. After giving a small incision on medial epicondyle, k-wire was passed first and with the help of drill guide to prevent ulnar nerve injury. Similarly a k-wire was passed from the lateral side in such a way that both pins cross each other proximal to fracture site. After completing k-wire fixation stability of reduction and fixation was checked by doing flexion and extension movements at elbow under direct vision of fracture in order to check the stability of fixation. Hemostasis was secured and wound closed in layers under a suction drain. Dressing with padding was done. Tourniquet was deflated and total time duration of its application recorded. Back slab was applied in pronation and 90 degree flexion at elbow. Immediately post operatively, the arm was kept elevated and physiotherapy of hand started soon to prevent swelling. Neurological examination was done as soon as patient came out of anesthesia. Antero-posterior and lateral view radiographs of elbow were taken. Patients were discharged after 24hrs and active movements of fingers and shoulder were started. Stitches were removed on 7th post op day. K-wires and back slab were removed at 3rd week and active range of motion started at elbow. Patient were examined after 1, 3, and 12 weeks postoperatively. The 12th week examination was confirmatory regarding outcome i.e. functional factor (range of motion at elbow) and cosmetic factor (change in carrying angle at elbow). Other outcome variable i.e. radiological union was also noted. All the data was recorded on especially designed questionnaire.

RESULTS

The study sample consisted of 60 patients. The mean age for the sample was 7.77 ± 2.50 and the majority of children were males (71.7%). History of fall was the major mode of injury. 45 patients (75.0%) presented with history of fall while playing, fall from height in 10 patients (16.7%) and road traffic accident in 3 patients (5.0%). Fractures at left elbow constituted 35 patients (58.3%) and 25 patients (41.7%) had fractures of right elbow. Functional outcome of 46 patients (76.7%) patients was excellent, 10 patients (16.7%) was good, 3 patients (5.0%) was fair and 1 patient (1.7%) was poor (Fig I). Cosmetic outcome of 47 patients (78.3%) patients was excellent, 9 patients (15.0%) was good, 3 patients (5.0%) was fair and 1 patient (1.7%) was poor (Fig II).

DICUSSION

In this study sample consisted of 60 patients. The mean age for the sample was 7.7 ± 2.50 years. These results are supported by a study done in UK by Barlas k et al. The mean age was of 7.0 years and 83% fractures occurred in males. In a study conducted by Khan MA et al. in Pakistan, 71.7% of children with supracondylar fracture of humerus were of 5-10 year of age with a mean age of 7.4 years. Males were also more affected in this study with a male to female ration of 3.2:1. The children of 2-12 years of age with supracondylar
fracture of humerus were included although the sample size was small relative to my study (34 patients). Similarly a study consisting of total 37 patients with mean age of 5.9 yrs (2-12) and male to female ratio was 2.4:1 (70/30%) was conducted by Kazimoglu C et al\textsuperscript{13}. Ogunlade SO et al. conducted a similar study in Nigeria; the mean age was 6.9 years with male/female ratio 1.5:1\textsuperscript{14}. It seems that the most common reason of fractures in the age group of 5-8 yrs was because children were very active in this period of age. The fractures were more common in boys because they were more active, mobile and exposed to more trauma. The involved side was left in fifteen (75%) and right in five (25%) of patients in one of study conducted in Pakistan at Abbottabad by Shoaib M et al\textsuperscript{15}. 67.9% of cases presented with injury to the left elbow in a study conducted at Nigeria\textsuperscript{4}. The dominant extremity was left, with frequency of 35 cases (58.3%) and right side frequency of 25 (41.7%) in my study. This is contrary to another study conducted at Hyderabad, Pakistan by Shah RA et al. in which 69.1% children presented with left side supracondylar fracture of humerus\textsuperscript{15}. It seems that involvement of extremity in fracture is not specific.

The common mechanism of injury in a study conducted at Nigeria by Ogunlade SO, was fall at home in 85.7% of the cases\textsuperscript{16}. The results of my study were also comparable to this study in which (76.0%) presented with fall while playing at home. The fracture due to fall during playing accounted (60%) in a study conducted in Egypt by El-Adl WA et al\textsuperscript{2}. This Egyptian study was also a single center study but it was conducted over a period of one year and it also included Gartland type II and type III in studied group. The most common mechanism of injury was fall while playing shows that children are exposed more to fractures due to their active lifestyle like playing and jumping etc.

Functional and cosmetic outcome in my study was assessed by Flynn grading system. In Turkey, a study was conducted at an institute “Izmir Ataturk Training and Research Hospital” by Kazimoglu C et al\textsuperscript{13}. All of the patients with displaced Gartland type III fracture (n=37) were treated with primarily open reduction through a lateral incision. Results were based at the criteria of Flynn et al., 28 patients (75.6%) had an excellent result, six patients (18.9%) had a good result, two patients (4.6%) had a fair result and one patient (2.7%) had a poor result\textsuperscript{11}. The results regarding functional and cosmetic outcome in my study were comparable to the above study. Outcome was excellent in 46 patients (76.7%) of patients, good in 10 patients (16.7%), fair in 03 (5.0%) of patients and poor in 01 patient (1.7%).

The functional outcome was excellent in 30 (69.76%), good in 09 (20.93%), fair in 04 (09.30%), according to a study conducted in United Kingdom, by Barlas ket al\textsuperscript{11}. In a Turkish study conducted in 2004 by Ozkoc G et al., consisting of 44 patients, the results regarding functional outcome were excellent in 21 patients (48%), good in 06 patients (14%), fair in 04 patients (9%) and poor in 13 patients (29%)\textsuperscript{1}. Cosmetic results were excellent in 75.6%, good 21.6%, fair in 0% and poor in 2.7% of the in a study conducted in Turkey Kazimoglu C et al\textsuperscript{13}. Our results were excellent in 47 patients (78.3%), good in 09 patients (15.0%), fair in 03 patients (5.0%) and poor in 1 patient (1.7%) which were comparable to the above mentioned study.

In another study conducted in UK in 2005 comprising of 43 patients, the cosmetic results of open reduction and k-wires fixation were excellent in 34 patients (79.06%), good in 7 patients (16.27%), fair in 2 patients (4.65%) and poor in none (0%)\textsuperscript{16}. A total of 44 patients underwent open reduction and internal fixation with cross k-wires in a study by Ozkoc Get al. The cosmetic outcome was excellent in 31 patients (70%), good in 06 patients (14%), fair in 05 patients (11%) and poor in 02 patients (5%). The excellent results in children between of 2-9 yrs of age shows that these children require less time for remodeling than the older children in which the outcome is poor and less favorable.

CONCLUSION

In this study we found that open reduction and internal fixation with cross k wires for displaced supracondylar fractures of humerus in children is a safe and useful method. It provides excellent clinical and early radiological results. Regarding the limitations of study, my study was a single center study. The basic idea is to see the outcome of open reduction and internal fixation in displaced supracondylar fracture of humerus in children so that better method can be adapted in treating supracondylar fracture of humerus in children or proposed for further studies at national or international level. This study was conducted on a limited number of patients. This limited sample size might be a reason that the results in our study are not statistically significant. To see the actual picture of reality, a wide spread study on national level in different hospitals of Pakistan is required.

REFERENCES


