



OUTCOME OF DISPLACED SUPRACONDYLAR HUMERUS FRACTURE IN CHILDREN TREATED BY CLOSED REDUCTION AND PERCUTANEOUS PINNING.

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ABSTRACT:

Objectives: To determine the outcome of closed reduction and percutaneous pinning in the management of displaced supracondylar humerus fracture.

Study Design: Descriptive Cross sectional Study.

Place and Duration of Study: Orthopaedic department of Liaquat National Hospital, Karachi, from October 2007 to September 2008.

Material and Method: Forty children of 2-12 years of age, either gender with Gartland type II and III Supracondylar humerus fracture were enrolled in the study. Closed reduction and K-wire fixation under image intensifier was performed in all cases. Patients were followed according to protocol at regular intervals and the final assessment was done at twelve weeks in terms of functional and cosmetic outcome as excellent, good, fair and poor as per Flynn's criteria.

Results: Out of 40 patients, 28 (70%) were male and 12 (30%) were female. Mean age was 6 ± 2.72 years. Gartland type II fracture were 15 (37.5%) and type III were 25 (62.5%) The final outcome at the end of 12 weeks as per Flynn's criteria was excellent in 32 patients (80%), good in 6 patients (15%), fair in 1 patient (2.5%) and poor in 1 patient (2.5%).

Conclusion: Closed reduction and percutaneous pinning in children for displaced supracondylar fracture of humerus is a safe procedure and gives stable fixation with excellent results.

Keywords: Supracondylar fracture, Humerus, Closed reduction, Percutaneous pinning.

INTRODUCTION:

Supracondylar fracture of humerus is the most common fracture in children.^{1,2} It represents about 3% of all fractures in children with peak incidence between 4-7 years^{3,4} its incidence decreases with age.⁵ Gartland classified the extension type of fractures according to the degree of displacement of the distal fragment into type I, II and III.⁶

Gartland type I fractures (Undisplaced) are commonly treated by above elbow

cast without reduction. The displaced supracondylar fractures of humerus in children are common and challenging injuries for the orthopaedic surgeons. Different treatment modalities have been reported, ranging from skin traction in abduction, skeletal traction, closed reduction and plaster cast immobilization, closed reduction and percutaneous pin fixation to open reduction and Kirschner wire fixation.^{7,8}

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However, the results of most of the modalities have not been satisfactory and complications such as Volkmann's ischemic contracture, myositis ossificans, nerve injuries and malunion are known to occur resulting in crippling deformities of the extremities. The results of closed reduction and percutaneous pin fixation are promising and gain popularity worldwide. In a study published in 2008 revealed that in cross K-wire group (n=79) using Flynn's criteria 91.1% excellent, 6.3% good, 1.2% fair and 1.26% poor results at 14 weeks follow up. In lateral K-wire group (n=23) 91.3% excellent, 4.3% good, 4.3% fair and no poor result. Eight patients got superficial pin tract infection and seven patients sustained ulnar nerve injury post operatively.⁹ This study was undertaken to validate the above results so the same could be practiced and advocated in future.

PATIENTS AND METHODS:

A cross section study was conducted between October 2007 to September 2008 in Orthopaedic department of Liaquat National Hospital, Karachi. Permission from Institutional ethical committee was taken for this study. Forty children of 2-12 years of age, either gender with Gartland type II and III (Fig I & II) Supracondylar humerus fracture were enrolled in the study by purposive sampling technique, as per inclusion criteria. Informed consent was taken from the parents for inclusion in the study as well as for the procedure. Children with Supracondylar fracture associated with vascular injury and with metabolic bone disease were excluded.

Closed reduction and K-wire fixation using image intensifier under general anaesthesia was performed in all cases. Longitudinal traction was first applied to disengage the fracture fragments. An assistant provided

counter-traction; medial or lateral displacement was corrected. Next, the forearm was rotated to correct the rotational deformity. The elbow was then flexed maximally, maintaining traction and surgeon's thumb was used to push the olecranon forward, which corrects the posterior displacement of the distal fragment. The reduction was assessed with the fluoroscope.

A smooth 1.6 mm K-wire was used for internal fixation. Ulnar nerve was palpated posterior to the medial epicondyle, it was displaced posteriorly with the surgeon's thumb and the medial K-wire were inserted percutaneously. If the ulnar nerve was not palpable, it was gently retracted by fine clamp through a small incision made over the medial epicondyle posteriorly while the medial k-wire were inserted through the center of the medial epicondyle. The reduction was checked by fluoroscope. The pins were left protruding through the skin and were bent 90°. The upper extremity was placed in a splint with the elbow in 80-90° flexion and neutral rotation.

Patients were followed at regular intervals. At three weeks, K-wire was removed, at four weeks back slab removed and gentle exercise was advised. At six weeks active range of motion was advised. The final outcome was measured at twelve weeks as per Flynn's criteria.

RESULTS:

Out of 40 patients 28 (70%) were male and 12 (30%) were female. Male: Female ratio was 4:1. Mean age was 6.272 years. There were 15 (37.5%) and 25 (62.5%) of Gartland type II and III fractures respectively (Figure III). Left side arm involved in 32 patients (80%) and right side in 8 patients (20%). The mechanism



Of injury in 36 patients (90%) was fall from height; and the remaining 4 (10%) cases were road traffic accident with no associated fractures. The final outcome at 3 months follow up according to Flynn's criteria was excellent (Table I) in 32 patients (80%) (i.e. both loss of elbow motion and loss of carrying angle was 0-5 degree). Good in 6 patients (15%) (i.e. both loss of elbow motion and loss of carrying angle was 6-10 degree). Fair in one patient (2.5%) (i.e. both loss of elbow motion and loss of carrying angle was 11-15 degree), and poor in 1 patient (2.5%) (i.e. both loss of elbow motion and loss of carrying angle was >15 degree).

Figure III: Type of supracondylar humerus fractures according to Gartland classification (n=40)

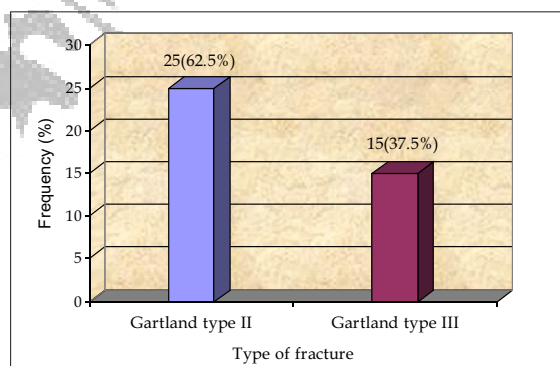


Figure I



Figure II

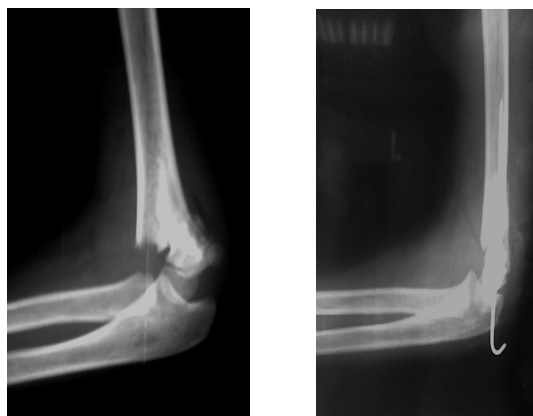


Table I: Treatment Outcome According To Flynn's Criteria At 3 Months

Outcome	No. of Patients (%)
Excellent	32 (80%)
Good	6 (15%)
Fair	1 (2.5%)
Poor	1 (2.5%)

DISCUSSION:

The displaced supracondylar fracture of humerus in children is one of the most common and challenging injury for the orthopedic surgeons. The aim of the treatment was to gain excellent results cosmetically and functionally with near about normal range of elbow movements. Supracondylar fractures of the humerus need a precise treatment in order to obtain a satisfactory result because of the low bone remodeling associated with these injuries.

In our series the mean age of children was 6 ± 2.72 years with Male: Female ratio of 4:1. Similar findings was found in a study conducted Iqbal J,¹⁰ had mean age of 6.5 ± 1.55 years and M:F ratio of 5:1. Study done in Karachi found mean age as 7 years



and male female ratio of 3:2.¹¹ De Las Heras et al¹² found the mean age of 6.7 years. Therefore, we can say that it is the most frequently occurring fracture between the ages of 5-8 years. There was no iatrogenic ulnar nerve injury in our case series because the ulnar nerve was identified before inserting the medial K-wire by palpation or medial incision.

In a study by Green et al,¹³ there were no iatrogenic ulnar nerve injuries in 65 patients when similar measures were adopted. There was no significant difference in the incidence of ulnar nerve injury between the two groups of patients treated by cross pin fixation and two lateral pin fixations, in a study conducted by Foad et al.¹⁴

There are studies^{10,11,12} stating pin site infections as 3.9%, 16% and 19% respectively, but there was no case of pin site infection in our series. Our results can be compared with the study conducted by Green DW et al¹³ strict sterilization can control rate of pin site infection.

In our study, the outcome as per Flynn's criteria were excellent in 32(80%) patients, good in 6 (15%), fair in 1 {2.5%) and poor in 1(2.5%) with overall satisfactory result in 95% patients. In an international study by De las Heras et al¹² showed excellent result in 90.9%, fair in 3.9% and poor in 5.2% with an overall 96% satisfactory result in total 79 patients. In another study by Mazda et al¹⁵ showed excellent result in 91.6% patients, good in 46% and poor in 3.7% with overall 96% satisfactory result. Shoaib et al¹⁶ showed excellent results in 13 patients (65%), good in 4 (20%) patients, fair in none of the patients and poor in 3 (15%) patients with overall 85% satisfactory and 15% unsatisfactory result in total 20 patients.

CONCLUSION

This study revealed that closed reduction and percutaneous pinning in children with displaced supracondylar fracture of humerus provide stable fixation with excellent results cosmetically as well as functionally.

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