

PERCUTANEOUS PINNING IN DISPLACED SUPRACONDYLAR FRACTURE OF HUMERUS IN CHILDREN

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ABSTRACT

Aim: to study the outcome of Percutaneous pinning for the treatment of displaced supracondylar fracture of humerus in children

Methods: This study was conducted at orthopedic unit of Prince Ali Hospital, Alkarak, Jordan from 2000 to 2005. All the children included in this study were aged 2-12 years with close and displaced supracondylar fracture of humerus with presentation within 24 hours after fracture. Children with compound fracture or fracture with vascular injury were excluded. Outcome measures were according to Flynn criteria i.e. loss of elbow motion and carrying angle.

Results: The children presenting were 21 male (70%) and 9 females (30%). The involved side was left in 24 (80%) and right in six (20%) of patients. Twenty eight patients (93%) had extension type and two (7%) had flexion type of fracture. Our result showed excellent outcome in twenty (67 %), good outcome in six (20 %) and poor outcome in four (13 %).

Conclusion: Percutaneous pinning is safe, cost effective, time saving and provides greater skeletal stability with excellent results.

Key Words: Percutaneous Pinning, Supracondylar fracture, Humerus fractures.

INTRODUCTION

Supracondylar fracture of humerus is the most common fracture in children. There are two types of supracondylar fractures of humerus in children: extension type (97 %) and flexion type (3%).¹ Ligament laxity and the anatomical structure of humerus tube (shaft) with flat transformation at the lower end makes it prone to fracture in the first decade of life^{2,3}. Its incidence decreases with age⁴.

The mechanism of injury is hyperextension, abduction or adduction of elbow during fall on dorsiflexed hand and flexed elbow⁵.

Because of the need for proper management of supracondylar fractures in order to preserve the joint function, a proper training is needed to adopt recent advances by young surgeons to deal with this challenges⁶.

There are various treatment modalities for the management of supracondylar fracture of humerus in children i.e. closed reduction and casting, open reduction and internal fixation (ORIF) and percutaneous pinning (PCP).

PCP can be done in emergency theatre under image intensifier preferably within first 8-12 hours of injury⁷. Closed reduction and casting for displaced supracondylar fractures in children may lead to loss of reduction and cubitus varus deformity while in the case of percutaneous pinning these complications are very low⁸.

Open reduction and internal fixation can reduce the fracture anatomically but chances of loss of elbow motion are high⁹.

Our study was carried out to draw the attention of orthopaedic surgeons to PCP as a viable alternative for the treatment of displaced supracondylar fracture of humerus in children and to the outcome of treatment with this modality.

MATERIAL AND METHODS

This study was conducted at Orthopaedic unit of Prince Ali Hospital (a medium size hospital that serves about 180000 people in the southern part of Jordan), Alkarak Jordan from 2000 to 2005. All children included in this study were aged 2-12 years with close and displaced supracondylar fracture of humerus with presentation within 24 hours after fracture.

Children with compound fracture or fracture with vascular injury were excluded.

Under general anesthesia the patient was put in supine position and scrubbing and toiling of the involved elbow carried out. Fracture was closely reduced behind the gentle traction, side to side elbow deformity correction and hyperflexion of elbow and pushing the distal fragment with opposite hand thumb, keeping the forearm in pronation to prevent displacement.

After close reduction 2 parallel pins were inserted laterally to avoid risk of ulnar nerve injury. For lateral pin insertion in posterolateral displacement, the arm was placed in internal rotation position on flourscopy platform. Pin was inserted in the centre of lateral condyle directed slightly posteriorly i.e 35 degree upward and 10 degree posterior to avoid olecranon fossa while passing through the far cortex. Now the stability and carrying angle was checked by extending the elbow.

In our study we avoided putting cross K-wires to avoid risk of ulnar nerve injury. K-Wires were of 1.6 mm thickness¹⁰.

Post operatively the elbow was kept in 90° flexion and protected by back slap above elbow. Patients were followed up for six months, initially at two week intervals for one month when K – wire was removed and then at one monthly intervals for the next five months.

In the follow up, patients were assessed according to Flynn criteria¹¹ (table-1). During follow up visits assessment of carrying angle and range of motion of elbow was done clinically which is sufficient to assess outcome of procedure adopted¹².

RESULTS

Of the total thirty patients presenting during this duration, twenty one (70%) were male and nine (30%) female. Twenty eight (93%) patients presented with extension type of supracondylar fracture while 2(7 %) with flexion type. The left elbow involved in 24(80%) patients and the right in 6 (20%) patients. Type II fractures were nine (30%) and type III were twenty one (70%).

Male to female ratio was 2.3:1 with mean age of 6.4 years. Ratio of left to right side fracture was 3:1. Age range was from 2-12 years.

According to Flynn criteria 20 (67%) patients were found to have excellent outcome (i.e., both loss of elbow motion and loss of carrying angle = 0–5 degree). Six (20 %) patients had good out come (i.e., both loss of elbow motion and loss of carrying angle=6–10 degree). Four (13 %) patients had poor outcome (i.e. either loss of elbow motion or loss of carrying angle=>15 degree). So the acceptable results in our study were in twenty six (87%) patients. None of the 26 patients turned out with fair results (i.e., both loss of elbow motion and loss of carrying angle=11–15degree)

Table-1: Flynn Criteria for Reduction Assessment

RESULTS	Cosmetic factor–loss of carrying angle (degree)	Functional factor – loss of motion (degree)
Excellent	0 – 5	0 – 5
Good	6 – 10	6 – 10
Fair	11 – 15	11 – 15
Poor	> 15	> 15

Table-2: Outcome of reduction by PCP

RESULTS	Number of patients	Percentage
Excellent	20	67%
Good	6	20%
Fair	0	0%
Poor	4	13%

During the follow up the complication of percutaneous pinning was as shown in table 3.

Table 3: Complications following PCP.

n = 7

Complication	Frequency	Percentage %
Nil	23	77.0
Infection	2	7.0
Elbow stiffness	3	10.0
Cubitus varus	1	3.0
Heterotopic ossification	1	3.0
Total	30	100.0

DISCUSSION

PCP has become standard technique for stabilizing displaced supracondylar fractures of the humerus in children. Either two lateral pins or one lateral and one medial pin may be used and both should penetrate the far cortex. Better stabilization¹³ and assessment of carrying angle is easy with full elbow extension.

PCP as compared to ORIF has less chances of elbow stiffness⁹ and is cost effective in terms of no use of suture material, and short hospital stay. PCP as compared to cast immobilization is safe in terms of negligible chances of compartment syndrome and loss of reduction⁷.

PCP in unstable or irreducible supracondylar fracture is the treatment of choice with elbow in

90° flexion to reduce chances of vascular compromise¹⁴.

By Flynn criteria¹¹ we had excellent results in 20(67 %) patients which are compatible with the results of Ababneh et al¹⁵ and Umer et al¹⁶ who recorded 87% and 100% results with excellent prognosis respectively. Similarly the rate of poor prognosis of 4 patients (13 %) is comparable with the 8 % recorded by Ababneh et al¹⁵.

In another study¹⁷ on 71 patients, 47 (66.2%) were boys and 24 (33.8%) were girls, with left side involvement in 49 (69.1%) patients and right side in 22 (30.9%), and the acceptable results (good/excellent) were 91.8%. This study is comparable with our study.

In a study¹⁸ on twenty four patients with age range from three to eleven years with male predominance (83% and female 17%), 16% had pin tract infection and one patient (4%) developed post operative ulnar nerve injury(which recovered completely) . In this study good functional results were obtained in 21 (92% and poor results in 2 (8%) at the end of follow up. These results are comparable to our results

Our study reveals extension type of fracture in 28 (93%) and flexion type in 2 (7%) patients comparable with study conducted by Cekanaska et al,²⁰ in which 90 (96.7%) were extension type and 3 (3.3%) were flexion type. Thus after comparing our results with national and international study, our results are encouraging. We can achieve up to 100% excellent results if we could practice this procedure in every displaced supracondylar fracture of humerus under fluoroscope in children.

CONCLUSION

Closed reduction of displaced supracondylar fracture of humerus with 2 PARALLEL percutaneous pinning in children gives stable fixation with excellent results in addition to that it is a safe, time and cost effective method with minimal complication .

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