

CLOSED REDUCTION AND PERCUTANEOUS PINNING OF GARTLAND TYPE II AND TYPE III SUPRACONDYLAR FRACTURES OF HUMERUS IN CHILDREN

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ABSTRACT

BACKGROUND

Supracondylar fractures of humerus in children are common injuries next only to clavicle and both bone forearm fracture in paediatric age group. They have a male predominance accounting for 16% of all paediatric fractures and 60% of all paediatric elbow fractures. They classically occur as a result of fall on an outstretched hand. There is no controversy regarding management of undisplaced fractures. The treatment modalities of partially displaced and completely displaced fractures are many. Recurrence of displacement occurs in spite of accurate closed reduction and immobilization in flexion. The difficulty in adequately stabilizing a closed reduction without resorting to the extremes of positioning has led to the development of internal stabilization procedures. In literature the most notable evolution in the management of elbow injuries has been an increasing emphasis on early motion.

MATERIALS AND METHODS

Thirty five children who suffered either Gartland type II or type III supracondylar fractures were included in the study. All of them were treated with closed reduction and percutaneous pinning under C arm control. The study period spanned January 2016 to January 2017. All the patients were subjected to general anaesthesia. Common postoperative protocol was followed. The study was conducted at the Department of Orthopaedics, Andhra Medical College, Visakhapatnam.

RESULTS

The functional results were graded based on Flynn et al grading (Table -1). Results were graded with cosmetic and functional factors separately.

CONCLUSION

Closed reduction with percutaneous fixation gave good to excellent result in majority of cases. Open reduction and fixation should be reserved for cases which do not get reduced by closed reduction with two or more attempts, open fractures and fractures with vascular injury.

KEYWORDS

Elbow Joint, A02.835.583.290, Fracture Fixation, E04.555.300, Child, M01.060.406.

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BACKGROUND

Conservative management of supra condylar fractures of humerus demand great care in treatment because, if it is not treated properly, it may give rise to neurovascular compromise. It is difficult to obtain and maintain reduction in cast without any fixation. Poor late results occur because of stiffness of elbow and/or mal union. Most frequently used methods of treatment are closed reduction and application of cast, skeletal traction, closed reduction and percutaneous K-wire fixation and open reduction and internal fixation with

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K-wires. The aim of treatment of supracondylar fractures is to achieve functionally and cosmetically satisfactory results with negligible complications, assuring low cost of treatment. Closed reduction and percutaneous fixation with K-wires gives more stable fixation, better anatomical reduction with minimal complications. So, closed reduction and percutaneous fixation with K-wires is the most commonly accepted treatment of displaced supracondylar fractures of the humerus in children.

Aims and Objectives

1. To study anatomical and functional results of closed manipulation and per cutaneous k wire fixation of supra condylar fractures of humerus in children.
2. To study the complications of the procedure.

MATERIALS AND METHODS

All children who attended the emergency department at King George Hospital, Visakhapatnam with supracondylar fractures during the period January 2016 to January 2017

(Gartland Type II & III) were treated with closed reduction and manipulation under C-arm control. All fractures were reduced under general anesthesia. After draping, longitudinal traction was applied with forearm in supination, medial and lateral displacement were corrected with valgus and varus angulation movements respectively under traction and C arm control. Then Forward pressure was exerted over olecranon by means of thumb. Elbow is gradually flexed, (for extension types), simultaneously monitoring radial pulse. If adequate complete reduction is obtained the elbow should be capable of smooth and almost complete flexion. After achieving satisfactory reduction all the fractures were fixed with two criss-cross 2.5 mm k wires percutaneously. In three cases two lateral k wires were placed to fix the fractures.

Postoperative Protocol

A posterior above elbow slab was applied. The operated limb was elevated. Careful observations for any neurovascular deficit were done at regular intervals. Antibiotics and analgesics were administered for 2-3 days. Post operatively an above elbow slab was applied for 3 weeks. K wires were removed on 21st day.

Follow up

After 3 weeks of immobilization, the elbow was protected from re injury with nothing more than a simple sling. This was discontinued when the elbow is not tender. After 3 week of immobilization active range of motion were stated. Serial radiograph were taken at weekly interval for 3 weeks. The children were followed up for a period of 1 years to 1 ½ years, and change in the range of movements and carrying angle were measured at regular intervals of 3rd week, 12th week and 12 months. Checkup made for onset of deformity and movement using Gonio meter. The functional results were graded based on Flynn et al grading. Results were graded with cosmetic and functional factors separately. The functional results were graded based on Flynn et al grading. Results were graded with cosmetic and functional factors separately.

Results	Rating	Cosmetic Loss in Carrying Angle (Degrees)	Functional Loss in Elbow
Satisfactory	Excellent	0-5	0-5
	Good	6-10	6-10
	Fair	11-15	11-15
Un satisfactory	Poor	>15	>15

Table 1. Flynn et al Grading

Inclusion Criteria

- 1) Age between three to twelve years.
- 2) Those presented within 0 to 4 days.
- 3) No previous fracture in the same elbow
- 4) No associated fracture in the same limb.

Exclusion Criteria

- 1) Age less than three years and more then twelve years.
- 2) Open fractures
- 3) Fracture requiring open reduction
- 4) Inability to perform neurological evaluation
- 5) Floating elbow

RESULTS

Out of 35 cases, 24 cases sustained fracture due to fall while playing and the 5 cases due to fall from height and the remaining 6 cases were due to other methods. All patients presented with pain, swelling, "S" shaped deformity. On examination all patients had diffuse swelling all around elbow Average period from injury to presentation was 8 hours. Mean age being 8.5 years 25 boys and 10 girls. 28 Patients presented with involvement of left side and remaining 7 patients' right sided. Average range of period from injury to surgery was 24 - 36 hours. Age distribution was between 4-12 years. Mean age was 8.5 years. Seventy one percent of the patients were males and 29% were females. In our study of 35 patients 33 patients (94%) had postero medial displacement. Two patients had postero lateral displacement. In our series of 35 cases all the cases were treated by closed reduction and per cutaneous pin fixation. Average time taken for injury to surgery was 24 - 36 hrs. The final results were compared with two different studies results of closed manipulation and fixation. Our results were intermediate to these studies (Table-3). In our series of 35 cases we had 2 traumatic median nerve palsy. No vascular injuries occurred during the present study.

Overall results in the present study were 40% satisfactory, 8.57% un satisfactory and another 8.57% were poor (Table-2).

Results	No. of Patients	Percentage
Satisfactory	14	40%
Excellent	03	8.57%
Good	11	31.4%
Fair	01	2.857%
Un Satisfactory	03	8.57%
Poor	03	8.57%

Table 2. Overall Results Flynn Criteria

Study	Follow up	No. of Patients
Fowles Kassab	2 years	23
Flynn	2years	52
Present study	18 month	35

Table 3. Comparison with Other Series- CRIF (Sample Size)

DISCUSSION

In a study by de Gheldere A and Bellan D, on 74 patients with Gartland Type II and III fracture managed by closed reduction. The purpose of the study is to give a more precise limitation of this technique. This study suggests that Gartland Type II and pure posterior or posteromedial displaced Gartland type III fractures can be treated by closed reduction and immobilization with success, whereas Type III fractures with posterolateral displacements should

preferably be fixed by open reduction and internal fixation.¹ John Dunlop, in his observation on supra condylar fractures of the humerus in children offered the most important stumbling block to reduction, not because the fragments cannot be brought end to end, but because of a difficulty in maintaining the reduction. Upper and lower fragments become rotated in their relation to each other and fracture surface at that particular level consist of extremely narrow edge rarely more than 4 to 5mm. When such a reduction was accepted, deformity was a sure outcome. About 60% of those treated by manipulative reduction and immobilization had varus deformity. 50% of these patients had limitation of elbow motion possibly because of new bone formation in olecranon or coronoid fossa. These observations emphasizes the importance of accurate anatomical reduction of fracture and restoration of pillars and fossae.² Blounts caution against operative management given way to modern concepts of skeletal stabilization and soft tissue management which have greatly improved outcome.³

In our present series all the patients were followed up for a period of 3 -18 months. In 90% of cases there was considerable soft tissue edema. Pirone AM et al reviewed 230 patients treated by different methods. Excellent results were achieved by percutaneous pin fixation. Boyd et al prefer two laterally inserted K-Wires for percutaneous fixation, if fracture is stable. If it is unstable, they prefer crossed medial and lateral K-wires.⁴ Ponce et al reported a large series treated with different methods. They found significantly better clinical results in the patients treated with closed reduction and percutaneous pin fixation.⁵ In Mazda et al series of 116 patients 7 patients had ipsi lateral forearm bone fracture.⁶ Pirone AM et al in his series of 230 patients, there were 20 injuries of the ipsi lateral forearm, 18 fractures of the distal third of the radius and ulna, one fracture of the middle 3rd of radius and ulna and one Monteggia fracture dislocation.⁴ Millis MB et al noted 8.33% of associated fractures.⁷ In our series of 35 cases we had 2 cases of traumatic median nerve palsy .All patients recovered in 2 weeks postoperatively. In Srivastava study group 42. 2% of the patient had nerve injury. We had 3 cases of superficial pin tract infection. Two out of 3 subsided with antibiotics in 10 days but in one patient infection disappeared after removal of the K- wire, but there was no deep or bone infection.

In Srivastava study group of 42 patients about 14% had superficial pin tract infection.⁸ Ramsey RH, et al study of 15 cases, one patient had pin tract infection that had healed after 2 weeks of treatment.⁹ In our study we had 1 cases of cubitus varus deformity, two cases of proximal migration of K-wire occurred. This may be due to failure to pierce in the opposite cortex during insertion. In our series, 35 cases of closed reduction under C-arm with percutaneous fixation done. Three cases of 2 lateral K-wires, 32 cases of Criss - Cross K-wires applied. No difference in the clinical course of

these two types observed. Out of 35 cases, 3 cases were excellent, 11 cases were good, 01 case was fair and in 3 cases poor results observed (Satisfactory results 40%) accordingly Flynn's criteria.

In 3 cases, poor results were due to extensive comminution, extensive swelling of elbow leading to difficulty in reduction, Delayed reduction of fractures with repeated manipulations produced poor results. Average time taken for complete range of movement is 16 to 20 weeks

CONCLUSION

Closed reduction with percutaneous fixation gave good to excellent result in majority of cases. Open reduction and fixation should be reserved for cases which do not get reduced by closed reduction with two or more attempts, open fractures and fractures with vascular injury.

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