Research Article

A study of outcome of supracondylar humerus fractures in children treated by closed reduction and internal fixation by 'k' wires

Chetan R Jaju[1*], Rajendra G Malu[2]

[1]Assistant Professor, [2]Professor, Department of Orthopaedics, MIMSR Medical College, Maharashtra, INDIA.
Email: chetanjaju@yahoo.com

Abstract

Introduction: Supracondylar fractures of the humerus represent 50-70% of all elbow fracture in children in the first decade of life. Various modalities of treatment have been proposed for the treatment of displaced supracondylar fractures of the humerus in children. **Aims and objective:** To study the outcome of supracondylar humerus fractures in children treated by closed reduction and internal fixation by 'k' wires. **Materials and method:** The present study was conducted in the department of orthopedics of post graduate institute of Swasthiyog Pratishtan, Miraj. For the purpose of study total 40 children of supracondylar humerus fractures in were selected. Detail history and through clinical examination of each case was done and recorded on a prestructured proforma. Vascular and neurological status of extremity was evaluated. Mode of injury and time after injury was noted. The radiographs, antero- posterior and lateral of affected extremity were taken. Each fracture is divided into flexion or extension type. Extension type of fracture were further classified according to Gartland's classification in type I, II, IIIa and IIIb type I cases, for which no manipulative reproduction was required, were excluded from the study. Reduction was done under general anesthesia and under image intensifier control. Once the reduction was done it was confirmed by clinical and radiological evaluation. For II and type III, supracondylar fracture closed reduction and 'K' wire fixation was done. Complications if any, noted and results were graded according to Flynn's criteria in to excellent, good, fair and poor. **Results:** Extension type of injury was observed in 97.5% cases. According to Gartland's classification, 56.41% cases were of type II class whereas 33.33% cases were of type IIIa class. 50% children with suptrcondylar fracture were having excellent outcome whereas 27.5% children were having good outcome. Among the Gartland's class II fracture 63.63% children had excellent outcome which was followed by class IIIa and class IIIb. **Conclusion:** Thus we conclude that Closed reduction and 'K wire fixation is an excellent method of treatment for Type –II and Type –III fractures of suparacodylar humerus fractures in children. This method yield good results with minimal complications.

Key words: suparacodylar humerus fractures, closed reduction and 'K wire fixation, outcome.

[*]**Address for Correspondence:**
Dr. Chetan Rameshchandra Jaju, Assistant Professor, Department of Orthopaedics, MIMSR Medical College, Maharashtra, INDIA.
Email: chetanjaju@yahoo.com
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INTRODUCTION

Supracondylar fractures of the humerus represent 50-70% of all elbow fracture in children in the first decade of life.[1] The occurrence rate increases progressively in the first 5 years of life to peak between 5-7 years of age.[2] The supracondylar fracture of humerus demand great respect in treatment because if it is not treated properly it may give rise to many complications such as Volkmann's ischemic contracture, neurovascular injury, myositis ossificans, stiffness of elbow and malunion.[3] It needs accurate anatomical reduction and internal fixation. So, no longer is it acceptable to near 'not bad for a supracondylar fracture.[4] Various modalities of treatment have been proposed for the treatment of displaced supracondylar fractures of the humerus in children. In 1800, cooper and Hamilton use to treat these fractures with cuff and colar with elbow in flexation[5], Liston in 19th century and Robert in 1992 proffered immobilizing

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elbow in extension. In 1898, mouchet stressed importance of accurate reduction to get satisfactory results[6]. Cotton F.J. (1924) advised manipulation and maintenance of reduction with posterior splint with elbow at 90^0 flexion. Bohler (1929) used percutaneous 'K' wire to hold fracture fragment and a long arm slab.[7] Atten bargh in 1995 showed that varus or valgus tilts are not corrected by remodeling[8.] MC Lenon[9] in 1937 and Judet [10] in1953 abondend the flexion after reduction due to danger of developing ischaemia. Karp in 1940 said that cause of varus is epiphyscal injury to lower end of humerus his views was shared by lippilito[11] in 1986. In 1945, Boyd and Altenherg [12] and in 1973, Spitzer studided injuries in these factures and showed that radial, median and ulnar nerves were involved in that order of frequency. In the present study we tried to study the outcome of supracondylar humerus fractures in children treated by closed reduction and internal fixation by 'k' wires.

AIMS AND OBJECTIVE

To study the outcome of supracondylar humerus fractures in children treated by closed reduction and internal fixation by 'k' wires.

MATERIALS AND METHOD

The present study was conducted in the department of orthopedics of post graduate institute of Swasthiyog Pratishtan, Miraj. For the purpose of study total 40 children of supracondylar humerus fractures in were selected. After receiving the approval from the in institutional ethical committee approval and consent from the parents of the patients the study was initiated. Detail history of each case was recorded on a prestructured proforma including age, sex, laterality of fracture, and mode of injury, etc. Through clinical examination of patient was done in all the cases. Vascular and neurological status of extremity was evaluated. Mode of injury and time after injury was noted. The radiographs, antero- posterior and lateral of affected extremity were taken. Each fracture is divided into flexion or extension type. Extension type of fracture were further classified according to Gartland's classification in type I, II, IIIa and IIIb type I cases, for which no manipulative reproduction was required, were excluded from the study. Reduction was done under general anesthesia and under image intensifier control. Once the reduction was done it was confirmed by clinical and radiological evaluation. For II and type III, supracondylar fracture closed reduction and 'K' wire fixation was done. After 'K' wire insertion and confirmation of adequacy of reduction, above elbow splint was given in 90^0 flexion. All patients after reduction were admitted for 24 hours. During this period, close watch was kept on distal neurovascular status. Limb was kept elevated. At the time of discharge, patient was advised not to remove cuff and collar and to keep weekly follow up. At the follow up, splint was reinforced if loose without extending elbow. At the end of 4 weeks, splint was removed and patient was examined for union at fracture site i.e. for tenderness at fracture site and radiograph were taken. All the fracture was found united clinically at the end of 4 week. K- wire removed on the same day. All patients were advised gradual active mobilization and range of motion exercise. Patients were instructed not to do passive stretching and massage. After 6 months, range of movement at elbow of both sides was compared. Carrying angle of affected elbow compared with that of opposite side. Radiographs were taken and carrying angle was calculated radiologically. Complications if any, noted and results were graded according to Flynn's criteria in to excellent, good, fair and poor. The collected data was entered in the excel sheet and was analyzed and presented with appropriate graphs and tables.

RESULTS

Table 1: Age and sex wise distribution of cases

Parameter		No. of cases	Percentage
Age group (years)	0-5	9	22.5%
	6-11	27	67.5%
	<11	04	10%
Sex	Male	23	57.5%
	Female	17	42.5%

It was seen that the incidence of supracondylar fracture of hunmerus was common in 6 to 11 years of age group (67.5%). Male children predominance (57.5%) was observed in the present study.

Table 2: Distribution according to Type of fracture and Gartland's class of fracture

Parameter		No. of cases	Percentage
Type of injury	Extension	39	97.5%
	Flexion	1	2.5%
Gartland's classification (for extension type injury)	II	22	56.41%
	III a	13	33.33%
	III b	4	10.25%

Extension type of injury was observed in 97.5% cases whereas only one case was reported with flexion type injury. The extension type of fractures were further classified by using Gartland's classification and it was seen that 56.41% cases were of type II class whereas 33.33% cases were of type IIIa class.

Table 3: Distribution according post operative outcome by Flynn's criteria

Outcome	No. of cases	Percentage
Excellent	20	50%
Good	11	27.5%
Fair	6	15%
Poor	3	7.5%

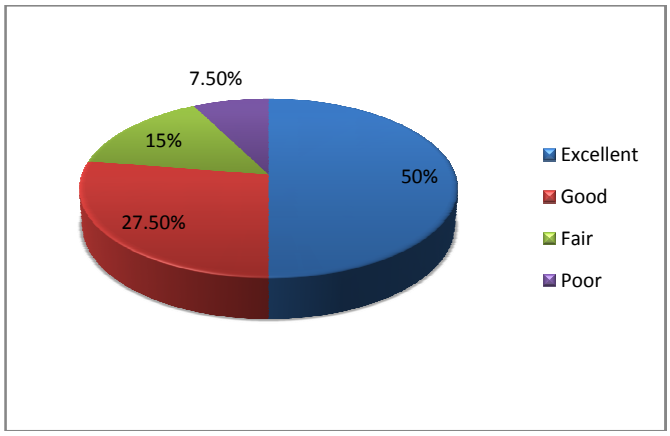

Figure 1: Postoperative outcome by Flynn's criteria

It was seen that 50% children with suptrcondylar fracture were having excellent outcome whereas 27.5% children were having good outcome.

Table 4: Distribution according post operative outcome according to Flynn's criteria in Gartland's class

Type	Gartland's class		
	II	IIIa	IIIb
Excellent	14 (63.64%)	5 (35.71%)	1 (25%)
Good	5 (22.73%)	4 (28.57%)	2 (50%)
Fair	2 (9.09%)	4 (28.57%)	0
Poor	1 (4.55%)	1 (7.14%)	1 (25%)

It was seen that among the Gartland's class II fracture 63.63% children had excellent outcome which was followed by class IIIa and class IIIb.

DISCUSSION

The present study was conducted with the aim to study the outcome of supracondylar humerus fractures in children treated by closed reduction and internal fixation by 'k' wires. Total 40 cases of supracondylar fracture of humerus were selected. It was seen that the incidence of supracondylar fracture of hunmerus was common in 6 to 11 years of age group (67.5%). Similar findings were also observed by Wilkins *et al.*[13].

Male children predominance (57.5%) was observed in the present study. Celiker *et al.*[14] and Wilkins *et al.*[13] also reported higher incidence in male children. This may be due to the fact that boys are more active and tend to get inured more often during play.

The typical mechanism is a fall onto an outstretched hand that puts a hyperextension load on the arm. The distal fragment displaces posteriorly in over 95% of cases [ref 2-4]. In the extension type of injury was observed in 97.5% cases whereas only one case (2.5%) was reported with flexion type injury. The extension type of fractures were further classified by using Gartland's classification and it was seen that 56.41% cases were of type II class whereas 33.33% cases were of type IIIa class.

In the present study we have not encountered any case of ipsilateral associated fractures. One case of compound injury in the form small punctured would was recorded. It was managed by closed reduction and 'K' wire fixation and the result was excellent.

In the present series, we encountered two cases of nerve injury before reduction. Out of these one case was ulnar nerve injury and other was radial nerve injury. No case of median nerve injury was observed. Percentage of nerve injury in our series was 5%. Wilkins *et al.*[13] in his study found 7% incidence of nerve injury out of which 3.15% are radial. 1.61% were unlar nerve and 2.24% were median nerve injuries. It was seen that all 2 cases of nerve injury in the present study recovered completely. In contrary Culp R.W *et al.*[15] reported recovery of 8 patients out of 13 nerve injury cases. Remaining cases improved after neurolysis after 7 months. One child treated by open reduction in his series lost the function of median nerve even after nerve grafting. In our series, all cases of nerve injuries recovered spontaneously. It means that they were Neuroparaxia or axchomesis. It proves that closed reduction is effective in cases of nerve injuries and open reduction is unwarranted as it has complications like stiffness of elbow, infection, myosists ossification etc.

In present series, one patient developed ulnar nerve injury after 'K' wire fixation. K wire was removed immediately and it recovered completely. We encountered three cases of cubitus varus (7.5%). There are different causes of it. Smith *et al.*[16] advocates medial tilt of distal fragment as the cause. Sweeny believes medial displacement and French pointed out medial rotation as the cause. Later Smith shown that these things predisposes to varus due to late development of varies tilt of distal fragment is unsupported by proximal fragment in rotational malalignment due to which it displaces proximally producing varus tilt. Same phenomenon we have encountered in present series. In our series, 2 of 3 patients who developed cubitus varus opted for surgery in the form of French osteotomy.

In the present study, Flynn's criteria were used for grading the results as it is an excellent indicator of functional impairment. It takes into account, loss of range of movement and loss of carrying angle. It was seen that 50% children with suptrcondylar fracture were having excellent outcome whereas 27.5% children were having good outcome. Celiker *et al.*[14], Rodriguz *et al.*[17] and Cramer *et al.*[18] also observed similar findings in their studies. It was seen that among the Gartland's class II

fracture 63.63% children had excellent outcome which was followed by class IIIa and class IIIb.

CONCLUSION

Thus we conclude that Closed reduction and 'K wire fixation is an excellent method of treatment for Type –II and Type –III fractures of suparacodylar humerus fractures in children. This method yield good results with minimal complications.

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