



Orthopaedics

EVALUATION OF FUNCTIONAL OUTCOME OF OPEN REDUCTION AND K WIRE FIXATION OF DISPLACED SUPRACONDYLAR FRACTURE OF HUMERUS IN CHILDREN AT GOVT.MEDICAL COLLEGE, THRISSUR – A PROSPECTIVE STUDY DURING OCTOBER 2019 TO APRIL 2020

Dr. Ashwin Baby

Senior Resident , Government Medical College ,Thrissur

Dr. Jose Francis C

Professor And Head of The Department of Orthopaedics, Amala Institute of Medical Sciences , Thrissur

ABSTRACT

INTRODUCTION: Supracondylar humerus fracture is one of the most common fractures in children and is the most common fracture around the elbow in pediatric population. The mechanism of injury most often is fall while playing. It is always difficult for the surgeon to decide up on the management unless the fracture is undisplaced or minimally displaced. Anatomical reduction is the key to attain a good functional outcome.

OBJECTIVES: The aim of the study is to evaluate the functional outcome of displaced supracondylar humerus fracture treated by open reduction and k-wire fixation and various postoperative complications of the procedure are also studied.

MATERIALS AND METHODS: A prospective study of the patients admitted and treated, between 1-10-2019 to 1-04-2020, at Thrissur Medical college who met the inclusion criteria, was done. Fractures were classified according to Gartland's classification. The study population was followed up for a minimum of 3 months and the functional outcome were evaluated based on Flynn's scoring system.

RESULTS: A total of 31 children were followed up in this study which included 10 girls and 21 boys. Most of the children were from the age group 7-10 (51%) years and fall from standing height was the most common cause of injury. None of the participants had any associated complications. 74% of the study population had excellent functional outcome and 16 % had good functional outcome.

CONCLUSION: This study demonstrated good to excellent outcome in majority of the patients. The results of this study were comparable to other studies in literature. This study concludes that adequate anatomical reduction of supracondylar humerus fracture through open reduction and k-wire fixation results in good functional outcome.

KEYWORDS : supracondylar humerus fracture, open reduction and k-wire fixation, Gartland classification, Flynn's criteria.

INTRODUCTION

Supracondylar fracture of the humerus is among the commonest injury around elbow in children. It constitutes 3% of all fractures in children and about 65.4% of all fractures around elbow in children.^[1]

This fracture is commonly associated with secondary loss of reduction if no internal fixation is done and hence often requires re-reduction. The incidence of fracture increases progressively in the first 5 years of life to peak between 5-7 years of age.^[2]

Boys have higher incidence of this fracture than girls with the ratio of 3:2. Supracondylar fractures occur through the distal thin part of the humerus above the physis through the metaphysis. Fracture line usually begins close to the articular surface of the anterior aspect of distal end of humerus and progresses proximally and posteriorly. Fracture line is transverse in frontal plane while travels backward and upward in sagittal plane.

Mechanism of Injury- Fall on outstretched hands is the major cause of supracondylar humerus fractures in children. Between the coronoid fossa anteriorly and olecranon fossa posteriorly is a thin segment of bone connecting the medial and lateral columns of lower end of humerus.

This segment forms the area of fracture in almost all cases.^[3]

Extension type of supracondylar fracture:

The extension type of supracondylar fracture generally occurs due to fall on the outstretched hand with elbow in hyperextension^[4].

Pronated hand results in posteromedial displacement and a supinated hand results in posterolateral displacement.

Posteromedial displacement is more common than posterolateral type of displacement.

Flexion type of supracondylar Fracture:

The mechanism of injury for flexion type of supracondylar fracture of humerus is believed to be fall directly onto a flexed elbow or direct trauma. The distal fragment is displaced anteriorly and proximally^[4].

In 1991, Wilkins introduced modifications of Gartland's classification as follows.^[5]

TYPE-I – Non-displaced fracture.

TYPE-IIA- partially displaced with the distal fragment in extension with some contact between distal and proximal fragments.

TYPE-IIB – partially displaced with posterior translation of distal fragment.

TYPE-III – complete, totally displaced fractures without any contact between fragments. Two sub groups, in this type depending upon whether displacement is posteromedial or posterolateral.

Supracondylar fracture of humerus are more commonly associated with different types of complications hence demands great respect in treatment.

Compartment syndrome (1%)
Brachial artery injury (0.5%)
Volkmann ischaemic contracture (0.5%)
Elbow stiffness (5-7%)
Nerve injury (3-22%)
Cubitus varus (14% in closed reduction and 3% in percutaneous pinning)
Myositis ossificans (0.5-1%)

Various modalities have been proposed for treatment of displaced supracondylar fractures of humerus in children such as closed reduction and slab application, open reduction with internal fixation^[6], closed reduction and percutaneous pin fixation, closed reduction and posterior intrafocal pinning^[7] closed reduction and Lateral External pinning^[8]. Closed reduction with cast immobilization has been traditionally recommended but necessity of repeated manipulation, loss of reduction can lead to malunion and elbow stiffness^[9].

Completely displaced supracondylar fracture of the distal humerus is a difficult injury to treat. Because of the difficulty in maintaining an adequate reduction with cast immobilization, stabilization of the reduced fractures with pins is preferred.^[10,11] K-wire fixation of displaced supracondylar fractures of humerus in children has been performed for over 50 years.^[12] In this fracture the anatomical reduction is always required because malunion with cubitus varus does not remodel with growth.^[13]

Various studies have shown that open reduction and internal fixation of displaced supracondylar fractures gives more stability with minimal complications and better functional outcome.

Case Study

Study population: All the patients attending Department of Orthopaedics with displaced supracondylar fracture of the humerus treated with open reduction and internal fixation with k-wires.

INCLUSION CRITERIA:

Age 1-16 of both sexes
Displaced supracondylar fractures (type 3)

EXCLUSION CRITERIA:

Patient unfit for surgery
Pathological fractures
Undisplaced fractures
Fractures with intercondylar component

PROCEDURE :

Procedure was done under adequate anaesthesia. Standard posterior approach with a midline incision was undertaken to fix fractures. Triceps was split in center, reduction was attained, after attaining reduction fracture was fixed with two crossed k-wires one each from medial and lateral epicondyle percutaneously. Stability was assessed per operatively and if in adequate a third pin was introduced and was immobilized with slab. K-wires were bent and kept outside the skin so that they could be removed after 3- 4 weeks and elbow could be mobilized.

Follow up and evaluation:

Postoperative radiographs were taken to confirm the reduction achieved. The limb was kept in elevation in above elbow slab. Active finger and shoulder exercises were started at the earliest. Parenteral analgesics and antibiotics were given in the first three days of postoperative period. Sutures were removed on the tenth day, and were reviewed on 3rd week post surgery for K-wire removal and mobilization of elbow were started.

Patients were followed up for a period of 12 weeks post surgery and the functional outcome was assessed based on Flynn's criteria^[14].



Figure 1: pre operative X ray

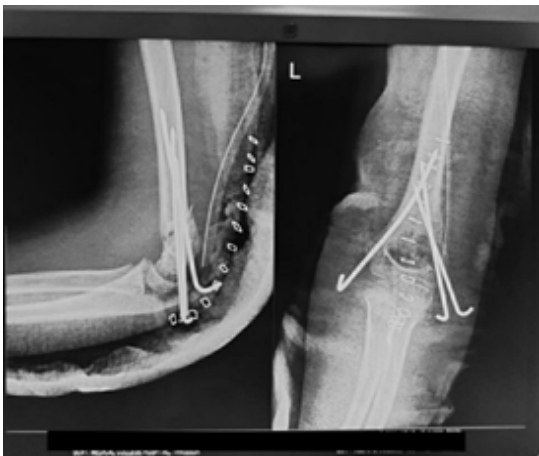


Figure 2: Immediate post operative



Figure 3: post operative x ray at 12 weeks



Figure 4: Follow up picture at 12 weeks showing carrying angle and range of motion

RESULT:

In our study Among the 31 children 2 girls were in the age group 1-4 years and no boys were there in this group. Maximum number of

children were in the age group 9-12 years. The mean age was 9.12yrs.

Table 1: Age Distribution

AGE GROUP (YEARS)	TOTAL	PERCENTAGE
01-04	2	6.4
05-08	7	22.5
09-12	16	51.6
13-16	6	19.3
TOTAL	31	100

Table 2: Gender Distribution

SEX	Frequency	PERCENTAGE
Boys	21	67.7
Girls	10	32.2
Total	31	100

Among the 31 children 21 were boys and 10 were girls.

Functional outcome was evaluated based on **FLYNN'S CRITERIA**. Flynn's scoring was based on loss of carrying angle and loss of motion. 23(74.4%) among the 31 children treated by open reduction and k-wire fixation had loss of motion of only 0-5°.

16% (5) had 6-10° of loss of motion and 9.5%(3) had 11-15° of loss of motion. None of the children had loss of motion more than 15°.

No significant loss in carrying angle was noticed in any of the children.

From the data of this study 74.4 % of the study population had excellent results and 16.1% had good results.9.5% had fair outcome. None among the study population had poor outcome.

Table 3: Functional outcome

Outcome	Number	Percentage
Excellent	23	74.4
Good	5	16.1
Fair	3	9.6
Poor	0	0

CONCLUSION

This single center study series demonstrated good to excellent results in majority of the study population following open reduction and fixation with k-wires. The findings from this study substantiates findings from other well designed studies showing association between functional outcomes.

A better functional outcome was noted in patient population where good anatomical reduction was attained.

Open reduction and internal fixation is always the right choice in managing severely displaced, difficult to reduce supracondylar humerus fracture in children.

Management of Type 2 and Type 3 fractures with cortical continuity is best decided by the treating surgeon based on his preferences and experience. Regardless of the method of treatment, anatomical reduction is the key to excellent functional outcome.

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