Original article

Evaluation of treatment result of Displaced Supracondylar Fracture of Humorous in Children treated by open versus closed reduction with K-wire fixation

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Abstract

Background: Displaced supracondylar fracture of humerus in Children and both close reduction and percutaneous K-wire reduction are common practices; it is necessary to explore which procedure is mostly suited for a country which has scarce resources.

Methodology: This is a Comparative Prospective observational study (Case series) designed to assess the success rate of closed reduction and Percutaneouis K-wire fixation with the help of C. arm in the early management of displaced supracondylar fracture of humerus in Children from June 2017 to December-2021 in Sikder Women's Medical College and Hospital.

Result: A total of 30 patients of displaced supracondylar fracture of humerus presenting between ages 3-12 years, 30 patients were subjected to two lateral K-wire fixation and medial - lateral cross K-wire fixation. Informed written consent was taken from patient's guardian. Regular follow up was targeted for at least 9 months. Results was evaluated according to Flynn's grading. Mean age was 6.85± 2.37 years, number of patients was 30, left side are more affected. Males are more affected 22 (73%) than Females 8(27%). Average Hospital stay period was 1.26 days, mean follow up duration was 4.93 ±0.739 months. There were six excellent (20%); Eighteen good (60%), three (10%) fair and three (10%) poor result's according to Flynn's grading. Complications included Four (13.33%) case of pin tract infraction, Four (13.33%) cases of Fracture blister, one (3.33%) case of ulnar nerve plasy, Two (6.66%) cases of inadequate pin Fixation at first attempt.

Conclusion: Displaced supracondylar fracture with swelling, closed reduction and percutaneous K-wire fixation is a better method of treatment with less chance of iatrogenic nerve injury.

Key words: Closed reduction, Percutaneouis K-wire fixation, supracondylar fracture of humerus.
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Introduction

Supracondylar fracture of the humerus is the second most common fracture in children (16.6%) and the most frequent before the age of seven years.[1]

Supracondylar fractures of the humerous account of 60% of all the fractures around the pediatric elbow. Closed reduction and percutaneous pinning under fluoroscopic guidance is the procedure of choice for the treatment of these fractures rather than open reduction.[2]

This study tried to show that close reduction and percutaneous K- wire fixation is a good method of treatment of displaced supracondylar fracture in children. rather than open reduction.

Materials and methods

Methods: Prospective observational study was conducted from June -2017 t December-2021 in Z.H. Sikder Women's Medical College & Hospital. 30 patients were included in this observation. These patients were selected with strictly maintained inclusion and exclusion criteria. Children between the ages of 3 to 12 years with Displaced supracondylar fracture Gartland type-II and III with open & closed both types fracture with extension type fracture, those presented early within 5 days were included in the study.

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Flynn's grading (Flynn et al. 1974)

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

Surgical Procedures

The methods were carried out under general anesthesia. These procedures done in the operation theatre in aseptic condition where image intensifier C-arm, a set of hand drill or electric drill, K-wires and wire cutter ensured. Patient under general anesthesia was placed on operation table with supine position and the child's arm on a radiolucent arm board. The extremity was drapped from axilla to finger tips. Gentle traction was applied by gripping the wrist and distal forearm and the forearm kept supinated and elbow was flexed about 20° to avoid to tethering the neurovascular structures over an anteriorly displaced proximal fragment. Counter traction applied by the assistant on the arm. Three to four minutes after traction the length of the arm restored first. It disimpacted the fracttu-e. Next any lateral or medial tilt was corrected by the Alingers on the proximal fragment and thumb on the distal fragment. In this position the carrying angle was checked and compared with the normal side. After reduction of frontal plane the reduction was checked with fluoroscopy (C-arm). Posterior displacement was corrected by maintaining traction on the forearm by the active hand; lower humerus was gripped by other hand with thumb over the olecranon. Steady flexion of the forearm and with thumb pushed the distal fragment forward and fingers pulling the proximal fragment backward elbow flexed up 90°. In a good reduction elbow could be fixed upto 120° without difficulty. In acute flexion the distal fragment is locked by the triceps bridge.)

Result

All patients with clinical and radiological evidence of closed extension type of supracondylar fracture of humerus. age between 3 years to 12 years in both sexes were included in this study. A total number of 30 patients were enrolled in this study as per inclusion and exclusion criteria. Patients were treated with closed and open reduction and percutaneous pinning. Patients were followed up regularly for 12 weeks. The results were assessed on the basis of Flynn's criteria (Flynn's) et.al. 1974. out of 30 patients terms of type of fracture, type-III fracture was predominan (63%), type-II fracture was (37%)

So among the population we will find almost 80% to 100% satisfactory result by this closed reduction and external fixation by K-wire. So it is quite acceptable out come.

Table No. 1: Distribution of the cases by age (n=30)

Age in year	No of Patient	Percentage (%)	Mean (±SD)
0-4	6	20	6.85±2.37
5-8	18	60	year's
9-12	6	20	
Total	30	100	

The youngest patient in our series is 3 years old and the oldest is 12 years. Majority were in 5-8 years. Among 30 patients mean age was 6.85 years with SD=±2.37 years.

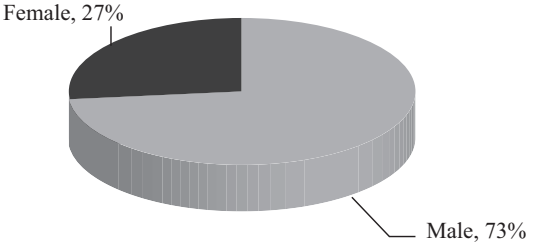

Fig.-1: Distribution of subjects by sex (N=30)

Completion

Table No. 2: Distribution of the cases by complication (n=30)

Complication	No. of Patient	Percentage (%)
Pin tract infection	4	13.33
Fracture blister	4	13.33
Ulnar nerve palsy	1	3.33
Failure of fixation	2	6.66
Volkmann's Ischemia	0	0
Readial Nerve palsy	0	0
No complications	19	63.33

Functional Outcome

Table No. 3: Distribution of the cases by loss of motion and carrying angle (n=30)

Loss of Motion degree	Loss of carrying angle in degree	Grading	Percent (%)
0-5	0-5	Excellent (6)	20
6-10	6-10	Good (18)	60
11-15	11-15	Fair (3)	10
16-22	18-25	Poor (3)	10

Table No. 4: Distribution of the results according to functional outcome (n=30)

Result	No of Patient	Percent (%)
Satisfactory	27	90
Unsatisfactory	03	10
Total	30	100

Table No. 5: Distribution of the cases by satisfactory level of outcome (n=30)

Result	No. of Patient	Reduction Technique	Percentage %
Satisfactory	15	Closed	90%
Unsatisfactory	15	Open	10%

Discussion

Supracondylar fractures of humerus in children are common injuries.[3] It is a fracture that occurs at the supracondylar area or the metaphysis of distal humerous.[4] Of all the fractures in the upper limb the supracondylar fracture of humerus is not only the common injury but can results in serious complications if not treated appropriately.[5] Anatomical peculiarity of the distral humerus and ligamentous laxity of the elbow makes the supreaeondylar area more suseeptible to fracture. Supracondylar fractures of humerus are extraarticular and occur following a fall on out stretched hand.[6] Ligamentous laxity allows for hyper extensibility of the elbow joint, which significantly increase in the incidence of thyese fractures in children.[7]

Conclusion:

Supraconylar fracture of the humerus is the most common fracture of the elbow in children and displacement is common. There are serveral methods (open or closed) of treatment of this fracture. Considering all aspects, it can be concluded that closed reduction and percutaneous k-wire fixation through lateral epieondyle is a better metod of treatment of displaced supracondylar fracture of hurmerus in children than open reduction due to infection.

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