

Functional Outcome of Treatment of Supracondylar Humeral Fracture in Children

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Abstract: Purpose: To assess the functional outcome of treatment of supracondylar humeral fracture in children.

Methods: This is a prospective study and conducted in 250 bedded district hospital attached Colonel Malek medical college, Manikganj from June 2016 to June 2017. 14 patients were supracondylar humeral fracture of age 4-10 yrs in our study. Severity of fracture was classified according to the Gartland system: Type-I and type-II fractures were treated with closed reduction and immobilization with long arm posterior cast in flexion, type-III fractures, closed reduction was first attempted followed by percutaneous kirschner wire fixation under general anaesthesia. If closed reduction failed, open reduction and internal fixation with smooth cross kirschner wire fixation was performed.

Results: Patients were followed up for one year. Treatment results were excellent in 7 patients, good in 4 patients, fair in 3 patients, and poor in none of the patient. All Patients were pain-free and none suffered in any activity restriction.

Conclusion: Closed reduction is a good treatment option for type I, II and type-III supracondylar humeral fractures.

INTRODUCTION

Supracondylar humeral fractures are the most common fractures around the elbow in children.¹ The injury results from a fall directly onto the elbow². The distal fragment may be displaced posteriorly and anteriorly and may migrate proximally in a completely displaced fracture. The ulnar nerve and also brachial vessel may be vulnerable and may be entrapped in the fracture or in the healing callus⁷ Various treatment options have been described: manipulation and casting in flexion⁸ manipulation and casting in extension^{5,9} traction¹⁰ closed reduction and percutaneous pinning by Kirschner wires,² and open reduction and internal fixation.⁷

This fracture is inherent instability, difficult in achieving reduction and specially holding reduction, and potential for loss of range of movement of elbow by keeping the elbow with posterior cast in flexion for a long time and also in case of inadequate reduction.

MATERIALS AND METHODS

The mean age of the patients of 10 boys and 4 girls were 6.4 years. Nine patients were injured in the left side and 5 patients were in the right side. No patient had any other associated fracture.

Only one had an ulnar nerve palsy at presentation from which the patient had recovered within 12 days of reduction.

Fracture severity was classified according to the Gartland system: type-I minimally displaced, type-II displaced with some integrity of the anterior or posterior cortex, type- III displaced with no cortical contact, type-IIIA posteromedial displacement, type-IIIB posterolateral displacement. In our study 3 Patients were type-I, 5 patients were type-II, 2 patients type- IIIA, and 4 patients type-IIIB.

Patients with type-I and type-II fractures were treated with immobilization in long arm posterior cast for 3 weeks and removed the posterior cast followed by gradual extend the elbow from flexion up to pain permit and then allowed gradual early active movement. Patients having type-II were treated with closed reduction under general anaesthesia and long arm posterior cast in flexion and type-III fractures were treated with closed reduction and percutaneous pinning under general anaesthesia and long arm posterior cast in flexion.

Close reduction was done by the following step wise manoeuvre-traction for 2-3 minutes in the long axis of length of the forearm with counter traction at the arm above the elbow, correction of any sideways tilt or shift and compare with the normal elbow and gradual flexion of the elbow to 120⁰, gentle traction was applied with the elbow in flexion and pronation of the forearm while maintaining traction and exerting posterior pressure in front of the proximal part of fracture and milking the posterior aspect of the lower arm and elbow to check posterior tilt and sideways pressure on the both humeral condylar area by the palm of the hand to correct medial or lateral shift, check the capillary filling of hand and feel the radial pulse if the distal circulation sluggish gradually extend the elbow at where position pulse reappear and at this position long arm posterior cast applied after checking the reduction by image intensifier and confirm satisfactory reduction by x-rays of elbow anteroposterior and lateral views.

In case of type-III fractures rotation and adequate reduction was checked following above manoeuvre with image intensifier and two percutaneous crossed pinning was undertaken under general anaesthesia, also guided by image intensifier with the elbow in 45⁰ flexion position, pin introduce at the direction to opposite cortex from the medial or lateral epicondyle in 40⁰ inclination from midline and 10⁰ in posterior angulation continue to opposite cortical area and adequate fixation was checked and elbow was

immobilized in a long arm posterior cast in 90° or more in flexion for 4 weeks; kirschner wires removed after 3 weeks and plaster was removed after 4 weeks and then gradual early range of movement exercises were initiated.

In our study 3 patients were failed closed reduction (1 patient type IIIA, 2 patients type IIIB), open reduction and internal fixation was performed through an anterior approach. A transverse incision was made across the antecubital space, develop a plane between biceps and brachialis, release the bicipital aponeurosis and protect brachial artery, retract the biceps and brachialis medially and brachioradialis laterally and protect radial nerve and posterior interosseous artery. To expose the fracture site and note its alignment with the proximal fragment, use small curet to remove haematoma at the fracture site and matching if any comminuted fragments and reduction was done of the fracture and crossed percutaneous smooth pinning was performed under visualization at 45° flexion in 40° inclination from midline and 10° posterior angulation, image intensifier help to adequate position of the pin and also direct visualization of the fracture site and after adequate fixation cutting the pins outside of the skin and bending outside portion of wire and again stability was checked and the wound closed with interrupted prolene suture and an above-elbow long arm posterior cast applied in 90° flexion; the wires were removed at 3 weeks and cast removed at 4 weeks respectively and early range of movement exercises initiated. All Patients were followed up weekly for the first 3 weeks and then monthly for one year.

RESULTS

Treatment results were assessed according to Flynn criteria (Table 1); outcome was deemed excellent in 7 patients, good in 4 patients, fair in 3 patients, and poor were none of the patients. Among 14 patients 3 patients were type-I and 5 patients were type-II, 2 patients were type IIIA, 4 patients type-IIIB were performed closed reduction, 1 patient type-III A and 2 patients type-IIIB were performed open reduction and percutaneous pinning. All patients of type-I and type-II closed reduction done without percutaneous pinning and 1 patient of type-III A and 2 patient of type-IIIB closed reduction with percutaneous pinnig, 1 patient of type-III A and 2 patients of type-IIIB open reduction and percutaneous pinning were done

Flynn's criteria¹²

Table 1

Grading	Loss of functional movement(extension)	Change in carrying angle (varus angle reduction)
Excellent	0°-5°	0°-5°
Good	6°-10°	6°-10°
Fair	11°-15°	11°-15°
Poor	>15°	>15°

Table 2: Functional Outcome

	Type-I, n= 3,		Type-II, n=5,		Type-III A, n=2		Type-IIIB, n=4	
	CR	ORIF	CR	ORIF	CR	ORIF	CR	ORIF
Excellent	3	0	3	0	0	0	1	0
Good	0	0	2	0	0	0	1	1
Fair	0	0	0	0	1	1	0	1
Poor	0	0	0	0	0	0	0	0

CR-Close reduction, ORIF-open reduction internal fixation

Three patients had superficial pin tract infections that resolved after wire removal. All the patients were pain-free and satisfied and no one in any permanent activity restriction.

DISCUSSION

supracondylar humeral fractures are common fracture in children. In flexion-type injuries are usually rare 2% -3% of all supracondylar fractures and it is unstable fracture, whereas in extension type fracture is comparatively stable and occurs usually 97%-98% in all supracondylar fractures. Flexion type supracondylar fractures are not included in our study. Common complications are cubitus varus deformity and reduction of carrying angle and extension lack. In our study 7 patients were excellent, extension lack were 0%-5% and reduction of carrying angle were 0%-5%, 4 patients were good results 6%-10% reduction of carrying angle and extension lack, 3 patients were fair results 11%-15% reduction of carrying angle and extension lack and none of the patients were poor results with more than 15% varus and carrying angle deformity.

The overall excellent results were 50% of patients, good results were 28.6% patients, fair results were 21.4% patients. In our study demonstrates the superiority of closed reduction and percutaneous pinning of supracondylar fractures. Only three patients need open reduction in type-III fractures, when 2 or 3 times closed reduction attempts failed.

CONCLUSION:

Closed reduction is a good treatment option for supracondylar fracture.

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Earlier Dr. Md. Aminur Rahman worked as Consultant (Orthosurgery) in National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR) in Bangladesh. Previously he worked in General Surgery at Sylhet M. A. G. Osmani Medical College and Sher-E-Bangla Medical College, Barishal. At present he is working as Assistant Professor (Orthosurgery), Colonel Malek Medical College, Manikganj, Bangladesh.