MANAGEMENT OF SUPRACONDYLAR FRACTURE OF HUMERUS IN CHILDREN BY CLOSE REDUCTION AND IMMOBILIZATION OF THE ELBOW IN EXTENSION AND SUPINATION

Iqtidar Ullah Babar, Nowroz Shinwari, Mohammad Rahim Bangash*, M Shoaib Khan†

Department of Orthopaedics, Lady reading Hospital Peshawar, *Department of Anatomy, Khyber Medical College, Peshawar, †Department of Orthopaedic Ayub Teaching Hospital Abbottabad, Pakistan

Background: A Supracondylar fracture of the humerus is the most common fracture in children around the elbow and is also called first decade injury. If not treated properly it may lead to disability due to elbow stiffness, and sequel of neuro-vascular injuries like Volkmann ischemic contracture etc. This study was undertaken to determine the outcome of close reduction and immobilization of the elbow in extension and supination in displaced supracondylar fractures of the humerus in children. **Method:** This Quasi-experimental study was conducted in the Department of Orthopaedics, Postgraduate Medical Institute, Lady Reading Hospital Peshawar, from January 2007 to December 2007. The inclusion criteria was Gartland Type III (completely displaced) supracondylar fractures of the humerus and the exclusion criteria was open or closed Gartland type-III fracture associated with neurovascular injury. Close reduction under general anaesthesia was done and the elbow was immobilized in extension by the application of 2 plaster slabs according. The follow up is based on the overall rating using the modified Flynn global criteria. **Results:** Out of 70 cases, in 56 cases (80%), reduction was acceptable; while in 14 cases (20%) it was unacceptable. Those with unacceptable reduction, 2nd attempt of close reduction were done but only eight were successful and the other six children required open reduction and internal reduction. Those with acceptable reduction went in to union with the carrying angle ±5º of the contra-lateral side and full range-of-motion. Excellent result were achieved in 35 cases (50%), good in 15 cases (21.43%), fair in 4 cases (5.71%) and poor in 6 (8.75%) patients. **Conclusion:** The extension method of close reduction and immobilisation with two slabs is safe method and give better cosmetic results in uncomplicated type III injures as compared to the flexion method.

Keywords: Supracondylar humeral fractures, Close reduction, extension method

INTRODUCTION

Supracondylar fractures of the humerus are the most common fractures in children around the elbow. It usually occurs during a fall onto an outstretched hand and is associated with considerable morbidity, including neurovascular complications, mal-union, myositis ossificans, and compartment syndrome.[1–3]

Currently, displaced fractures are treated by surgical means to achieve a cosmetically acceptable elbow because in contemporary studies any mal-union is considered to be a poor result whatever the function of the elbow.[4–8] However, where adequate surgical facilities are not available, these fractures have to be managed non-operatively.[9] The conservative protocol conventionally followed consists of close reduction and immobilisation by full flexion of the elbow and pronation of the forearm. This position is said to lock the fragment together preventing re-displacement. However, this conservative management has certain disadvantages. A supracondylar fracture, and especially a type III supracondylar fracture has invariably some amount of accompanying oedema and full flexion causes loss of the radial pulse.[10] To prevent vascular compression, the elbow is always kept in less than full flexion, which increases the chances of displacement. Moreover, it is difficult to evaluate the carrying angle of the elbow in the flex position both clinically and radiological and loss of reduction can remain undeducted.[11]

Rational of this study was to document another conservative method, which consists of immobilisation of the elbow in extension after close reduction. Extension of the elbow decreases vascular compression and also allows easy evaluation of the carrying angle both clinically and radiologically.[12,13]

MATERIAL AND METHOD

This Quasi-experimental study was conducted in the Department of Orthopaedics, Postgraduate Medical Institute, Lady Reading Hospital Peshawar, from January 2007 to December 2007.

The inclusion criteria was Gartland Type III (completely displaced) supracondylar fractures of the humerus and the exclusion criteria was open or closed Gartland type-III fracture associated with neurovascular injury and any ipsilateral fracture in the limb.

The procedure consisted of the following steps according to Chen *et al* technique:[12]

1. Close reduction of the fracture under local or regional anaesthesia.

2. Immobilisation the elbow in full extension and forearm in supination.
3. Fixation was achieved by two plasters slabs; one anterior and the other posterior. The posterior slab was wide enough to encircle 75% of the circumstance of the arm and the forearm, extending from the axilla to a point just proximal to the metacarpal heads. The anterior slab covers two-thirds of the anterior surface of the arm and forearm. Both were directly applied to the skin and fixed by an elastic bandage. The plaster was then moulded to obtain 20° to 30° of valgus at the elbow.

Follow-up included clinical and radiological examination at weekly interval during the 1st month and thereafter at monthly interval. After callous formation, slabs were removed and physiotherapy started. Serial assessment of the carrying angle and elbow range-of-motion done till final evaluation at 6 months after the index procedure.

Data was analysed using SPSS version 14.0. Frequency and percentages were used to present qualitative data and numerical data was presented as mean/average.

RESULTS

In this study 58 (83%) were boys and 12 (17%) were girls. Male to female ratio was approximately 5:1. The children's age ranged 4–10 years with a mean of 5.78 years.

In majority of cases (n=61), no previous attempted procedure was done, while in 9 cases history of previous attempted procedure was recorded.

Out of 70 cases, in 56 cases (80%), reduction was acceptable; while in 14 cases (20%) it was unacceptable. Those with unacceptable reduction, 2nd attempt of close reduction were done but only eight were successful and the other six children required open reduction and internal reduction. Those with acceptable reduction went in to union with the carrying angle $\pm 5^0$ of the contra-lateral side and full range-of-motion. Excellent result were achieved in 35 cases (50%), good in 15 cases (21.43%), fair in 4 cases (5.71%) and poor in 6 (8.75%) patients.

DISCUSSION

Supracondylar fractures of the humerus, especially type I and II injuries can effectively be managed conservatively by the conventional method of full elbow flexion with excellent results.[1–3,9]

Currently, displaced type III fractures are treated by surgical means but surgical facilities are not available everywhere and many complications are associated with conventional method of conservative management for displaced supracondylar fracture in children. Acute flexion of elbow produces further vascular compromise in an already swollen elbow and increases the chances of Volkmann ischemia where as anything less than acute flexion risks loss of reduction. Incidence of cubitus varus deformity is reported up to 14% with this method because when swelling subsides in situ elbow can extend inside the cast or slab and reduction is lost[4]. Another problem with this method is accurate assessment of Bauman's angle which needs full extension of elbow. Medial or lateral tilt or shift observed in immediate post reduction Jone's view may be altered because of faulty radiographic techniques.[11]

The extension method of immobilization was chosen for type III fractures for its better cosmetic outcome as compared to the flexion method as well as for its inherent safety features.[12,13] In flexion, the fragments are locked together and prevent re-displacement in the sagital plane but displacement can occur in the coronal plane and cubitus varus deformity is very common as no re-modelling occurs in the coronal even in young children.[2,3] In the extended position, on the other hand, the fragments are unstable but re-modelling will compensate for any mal-union in the sagital plane. Moreover, in the rare flexion type of fractures, the elbow is also immobilised in extension; therefore, the extension method can be used for the conservative management of all uncomplicated type III injures.

In contrast to conventional method of conservative management, results of our study showed that there was a 10% incidence of cosmetic deformity and the mean elbow score was 90. On the other hand the mean elbow score in the conventional method was only 72.[7] The difference with the other studies was statistically significant with regard to the incidence of cubitus varus and the elbow score ($p<0.01$).

CONCLUSIONS

The extension method of close reduction and immobilisation with two plasters slabs is safe method and give better cosmetic results in uncomplicated type III injures as compared to the flexion method.

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Address for Correspondence:

Dr. Iqtidar Ullah Babar, House # 62, Street 4, Sector N-3, Phase-IV, Hayatabad, Peshawar, Pakistan. **Tel:** +92-91-5830747
Email: iqtidarbabar@live.com