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Original Research Article

A Study on Complications of Supracondylar Fractures of Humerus in Children

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Abstract
Background: *Supracondylar fracture of the humerus is a common elbow injury in children. The main objective of this study was to determine the epidemiological characteristics and complications supracondylar fractures of the humerus in children.*
Material and Methods: *The study include fifty children from three to fourteen years of age having supracondylar fracture of humerus. Results were assessed by measuring carrying angle and range of movements at elbow and complications (if any) were recorded.*
Results: *Displaced fractures (Gartland type III) accounted for the majority of these fractures (58%) while rest 42 % (Gartland type I & II). 4% (2 of 50) patients sustained vascular injuries, compartment syndrome in 6% (3 of 50) of the patient while 2 patients had nerve lesions. Long term complications included: - cubitus varus, cubitus valgus, elbow stiffness and myositis ossificans.*
Keywords: *Supracondylar humerus fracture, K wire , complications.*

Introduction

Supracondylar fracture of the humerus is a common fracture of childhood[(1)]. In children, the supracondylar region consists of a weak, thin bone located in the distal humerus (figure 1). Most patients have a classical history of fall on an out stretched hand. As elbow forced into extension, the olecranon serves as a fulcrum and focuses the stress on the distal humerus causing fracture followed by pain and swelling over the elbow with loss of function of upper limb [(14,15)].

Supracondylar fracture can be classified into three main types according to Gartland Classification (figure 2). Type I refers to a fracture of the distal part of the humerus with no displacement, while type II refers to an angulated fracture of the distal part of the humerus with an intact posterior cortex, and finally, type III refers to a displaced fracture with no cortical contact. Several methods of treatment are available ranging from immobile-zation in above-elbow cast to closed/open reduction with or without percutaneous Kirschner-

wire (K-Wire) fixation[2]. Decision about treatment is usually made according to the type of fracture. Type I is usually treated by cast application for approximately 3 weeks, while closed and open reduction techniques are used in treatment of Type II and Type III supracondylar fracture[14]. This fracture is attended by immediate and late complications that contribute significantly to morbidity. Long term functional outcome and radiological appearance of a fracture treated in pediatric age group may be quite different from the immediate post-management status. Neurovascular complications associated with this fracture make it an orthopaedic emergency thus, understanding of this fracture is extremely important. Immediate complications associated with it are limb threatening[10,11] whereas late complications are a serious concern to functional status of the patient[12]. Due to the above reasons they require a strict vigilance and a proper management protocol.

This study is aimed to evaluate the complications associated to different types of supracondylar humerus fracture.

Fig. 1 Supracondylar humerus

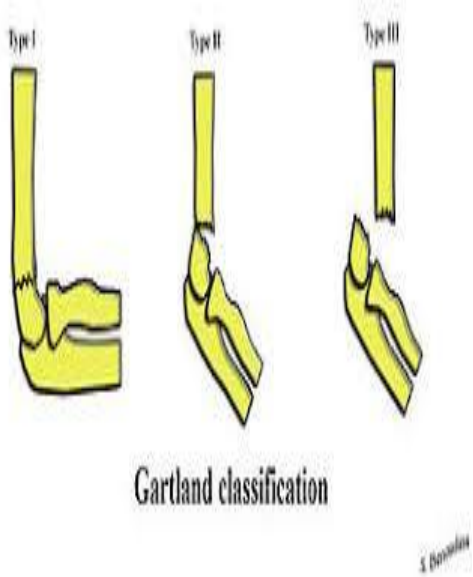

Fig. 2 Gartland classification of supracondylar fracture humerus in children

Material and Method

This study is a retrospective cohort design conducted at NSCB medical college, Jabalpur. All pediatric patients aged 3 to14 years, who presented to the casualty and OPD and were diagnosed to have supracondylar humeral fractures, were included in the study. All the cases were studied reviewed and followed for a minimum period of three months to twelve months. All pathological fractures were excluded from the study. Classification of Fracture Supracondylar Humerus - Type I fracture: Undisplaced. Type II fracture: Displaced with angulation, with an intact posterior cortex. Type III fracture: Completely displaced The data included mechanism of injury, pre-and post-operative examinations, type of fracture, time from injury to surgery, type of management, duration of immobilization and the presence of complications. X –ray was taken preoperatively, intraoperatively and postoperatively & were reviewed. Undisplaced (Gartland Type I) or minimally displaced fractures in children treated with an above-elbow splint in 90° of flexion for 3 weeks. For Gartland Type II and III fractures close reduction was done, if found stable after closed reduction casting at 90° of flexion but if more than 90° of flexion is needed to maintain

reduction, then in order to minimize risks of complications associated with the increased elbow flexion, stabilization of the fracture was with percutaneous pinning (K wires). For fractures not reduced on closed manipulation, open reduction and internal fixation was done (figure 3). During follow up patients were assessed clinically and radiologically. Immediate complications were recorded at the time patient presentation to the center while late complications at the time of follow up (figure 4). Functional assessment was done by Flynn's grade for elbow function. Functional loss of extension - flexion (degrees) & change in carrying angle (degrees) - Excellent 0 to 5, Good 6 to 10, Fair 11 to 15 and poor Over 15.

Fig 3 – type III supracondylar facture humerus treated with cross K wire fixation following closed reduction

Fig 4 – Malunion as cubitus varus (gun stock deformity)

Observation and Results

Out of 50 patients, 32 (64%) belong to age group 5-10 years. 35 patients were male and 15 female so male : female ratio 7:3. 38 cases (76%) involved left elbow showing predominance of left side over right. 48 cases (96%) had posterior (extension type) injury, while one had anterior (flexion) and one was severely communated. Out of 48 cases of extension type injury, displaced fractures (Gartland type III) accounted for the majority of these fractures, 28 out of 48 (60.4%) while rest 39.6 % (Gartland type I & II). Compartment syndrome was reported in 6% (3 of 50) of the patients which was treated in emergency through fasiotomy. 4% (2 of 50) had acute vascular injury that presented absent radial pulse and was treated by surgical exploration. Both cases were due to kinking of brachial artery and recovered satisfactorily after exploration. 4% patients (2 of 50) suffered from nerve injury involving median nerve in both cases that recovered partially over time with conservative management.

Long term complications included:- cubitus varus, cubitus valgus, elbow stiffness and myositis ossificans. Malunion in the form of cubitus varus (gun stock deformity) was found in 16 patient of 50 (32%) while cubitus valgus in 7 of 50 (14%) cases. Joint stiffness at elbow reported in 15 patients (30%). Joint stiffness in flexion (10 of 50), in extension (4 of 50) and in both in (1 of 50). Physiotherapy was prescribed to each patient having joint stiffness that gradually over time. Myositis ossificans was reported in 5 of 50 patients (10%). Oral Indomethacin 75 mg once daily dose was prescribed to all the patients. None of the patient with myositis ossificans required surgical exploration. None of the patient had sequel of Volkmann's ischemic contracture. Overall results in terms of recovery and functional improvement was excellent in 50% patients (25 of 50), good 36% (18 of 50), fair 10% (5of 50) and poor in 4% (2 of 50).

Conclusion

Supracondylar fracture of humerus is common in children of age group 5-10 years and is more common in male child than female. Left side elbow is most commonly affected and the commonest mode of trauma is fall on the outstretched hand. Extension type of injury is the commonest while flexion type of injury is rarely encountered. Good results can be obtained by closed method of reduction when reduction attempted within 3-4 days of trauma following subsidence of edema, hence closed reduction should be choice of treatment. However communated type fracture have unsatisfactory functional outcome.

Primary complication of supracondylar fracture humerus include compartment syndrome, which is dreaded complication, however if managed early give good response in children. Brachial artery injury is also a surgical emergency and urgent exploration for limb saving. Nerve injury especially in the form of median nerve lesion is also encountered, although is quite rare. Late / secondary complications include malunion as either cubitus varus (gun stock deformity) or cubitus varus, joint stiffness at elbow and myositis ossificans. These complications significantly affect the functional outcome of patient. Hence supracondylar humerus fracture in children should be taken seriously and managed early with all the related complications.

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