Research Article

Supracondylar humerus fractures in children: A descriptive study

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Abstract

Introduction: Fractures occur more often in the pediatric age group than in healthy adults. One reason for this is that children and adolescents are less skilled at risk assessment. Furthermore, bone is less stable—albeit much more elastic—during skeletal development than in adulthood. These properties explain both the higher incidence and the more rapid healing of fractures in children and adolescents. **Aims and objectives:** To study the various factors associated with Supracondylar humerus fractures observed in children. **Materials and method:** The present study was conducted in the department of orthopedics of post graduate institute of Swasthiyog Pratishtan, Miraj. For the purpose of study total 40 children of supracondylar humerus fractures in were selected. Detail history of each case was recored on a prestructured proforma including age, sex, laterality of fracture, and mode of injury, etc. Through clinical examination of patient was done in all the cases. Vascular and neurological status of extremity was evaluated. Mode of injury and time after injury was noted. The radiographs, antero- posterior and lateral of affected extremity were taken. Each fracture is divided into flexion or extension type. Extension type of fracture were further classified according to Gartland's classification in type I, II, IIIa and IIIb type I cases, for which no manipulative reproduction was required, were excluded from the study. The collected data was entered in the excel sheet and was analyzed and presented with appropriate graphs and tables. **Results:** majority of the children (67.5%) with suprachondylar fracture of humerus were in the age group of 6 to 11 years. The proportion of male was also observed higher as compared to female children. Left side was involved in 60% cases. Extension type of injury was obserfed in 97.5% cases whereas only one case was reported with flexion type injury. The extension type of fractures were further classified by using Gartland's classification and it was seen that 56.41% cases were of type II class whereas 33.33% cases were of type IIIa class. Radial pulse was absent in 7.5% cases. Incidence of nerve paresis was 5%. **Conclusion:** Supracondylar fracture of humerus is commonest elbow injuries in age group of 6 to 11 years with higher proportion of male children. Left sided extension type of injury was common with Gartland's classification class II.

Key words: children, Supracondylar fracture of humerus, Gartland's classification.

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INTRODUCTION

Fractures occur more often in the pediatric age group than in healthy adults[1,2]. One reason for this is that children and adolescents are less skilled at risk assessment [3,4]. Furthermore, bone is less stable—albeit much more elastic—during skeletal development than in adulthood. These properties explain both the higher incidence and the more rapid healing of fractures in children and adolescents. Due to fracture interstitial pressure increases within a closed fascial compartment which can lead to compartment syndrome. Disproportionate pain requiring increasing doses of pain medication is the first sign of compartment syndrome[5]. Gartland's staging system, based on the lateral radiograph, is widely used for supracondylar fractures as it can help guide treatment[6]. Gartland's Type I fractures are nondisplaced. Type II fractures are displaced with angulation, but maintain an intact posterior cortex. Type III fractures are completely displaced and lack cortical contact.

A majority of these fractures were treated with closed reduction and long arm casting with the elbow in a position of greater than 100^0 of flexion. This flexed posture helped maintain the fracture reduction, but lead to problems with vascular compromise and subsequent Volkman's contracture. After a closed reduction, percutaneous pinning maintains fracture reduction

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without the need for immobilizing the elbow in significant flexion.

AIMS AND OBJECTIVES

To study the various factors associated with Supracondylar humerus fractures observed in children.

MATERIALS AND METHOD

The present study was conducted in the department of orthopedics of post graduate institute of Swasthiyog Pratishtan, Miraj. For the purpose of study total 40 children of supracondylar humerus fractures in were selected. Detail history of each case was recored on a prestructured proforma including age, sex, laterality of fracture, and mode of injury, etc. Through clinical examination of patient was done in all the cases. Vascular and neurological status of extremity was evaluated. Mode of injury and time after injury was noted. The radiographs, antero- posterior and lateral of affected extremity were taken. Each fracture is divided into flexion or extension type. Extension type of fracture were further classified according to Gartland's classification in type I, II, IIIa and IIIb type I cases, for which no manipulative reproduction was required, were excluded from the study. The collected data was entered in the excel sheet and was analyzed and presented with appropriate graphs and tables.

RESULTS

Table 1: Age and sex wise distribution of cases

Parameter		No. of cases	Percentage
Age group (years)	0-5	9	22.5%
	6-11	27	67.5%
	<11	04	10%
Sex	Male	23	57.5%
	Female	17	42.5%

It was observed that majority of the children (67.5%) with suprachondylar fracture of humerus were in the age group of 6 to 11 years. The proportion of male was also observed higher as compared to female children.

Table 2: Distribution of cases according to various characteristics

Parameter		No. of cases	Percentage
Side of arm	Right	16	40%
	Left	24	60%
Type of injury	Extension	39	97.5%
	Flexion	1	2.5%
Gartland's classification (for extension type injury)	II	22	56.41%
	IIIa	13	33.33%
	IIIb	4	10.25%

It was seen that left side was involved in 60% cases. Extension type of injury was obserfed in 97.5% cases whereas only one case was reported with flexion type injury. The extension type of fractures were further classified by using Gartland's classification and it was seen that 56.41% cases were of type II class whereas 33.33% cases were of type IIIa class.

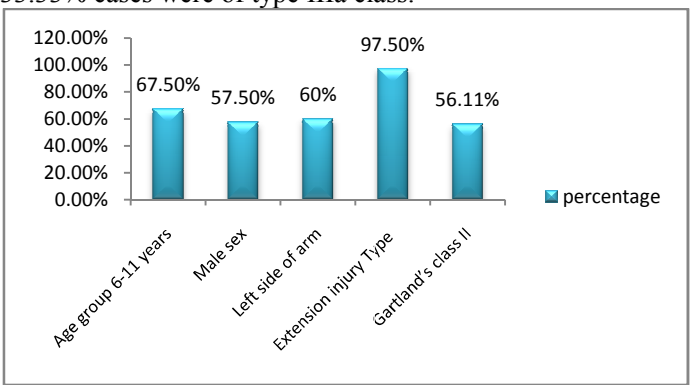

Figure 1: Various futures of Supracondylar fracture of humerus in children

Table 3: Distribution of cases according to neuro-vascular complication

Parameter		No. of cases	Percentage
Artery	Radial artery	3	7.5%
	Ulnar	1	2.5%
Nerve	Radial	1	2.5%
	Median	0	0%

Radial pulse was absent in 7.5% cases.Incidence of nerve paresis was 5%. One case was having ulnar nerve paresis where as other was having radial nerve paresis.

DISCUSSION

The present study was undertaken to study the various factors associated with the supracondylar fracture of humerus observed in children. The study was conducted in the department of orthopedics at Post graduate Institute of Swasthiyog Pratishtan, Miraj.

Supracondylar fracture of humerus is exclusively fracture of immature skeleton and mostly occurring in the first decade of life. It was observed that majority of the children (67.5%) with suprachondylar fracture of humerus were in the age group of 6 to 11 years. The average age was 7.55 years. Wilkins *et al.*[7] reported incidence of 85% in patients younger than 10 years with peak age being 6 to 7 years and average 6.6years. Watson and Jones reported average age as 7.5 years. Osman A A *et al.* found average age to be 6.5 years. Thus 6 to 8 years was commonest age group for high incidence of Supracondylar fracture of humerus. In these ages, suprocondylar is weak, as it is undergoing remodeling and is typically thinner with a more slender cortex, predisposing this area to fracture. In the present study, incidence of male child was more. 57.5% cases were male and 42.5% cases are female. Celiker *et al.*[8] and Wilkins *et al.*[7] also reported higher incidence in male children. This

may be due to the fact that boys are more active and tend to get inured more often during play. In present series, left elbow was involved in 60% cases and right elbow in 40% cases. In most other series also, left side is more involved. This may be possibly because left arm is frequently used in the protective reflexive to support during a fall. Also right arm has better control and better muscular development. Extension type of injury was observed in 97.5% cases whereas only one case (2.5%) was reported with flexion type injury. D.M. Williamson *et al.*[9] found 6% of flexion type cases in their study whereas Wilkinson *et al.*[10] reported 2.7% incidence of flexion type of fracture. Thus the findings were in correlation with the present study. The typical mechanism of fracture is fall onto an outstretched hand which puts a hyperextension load on the arm. Due to this the distal fragment displaces posteriorly in about 95% of cases [11]. As the elbow is forced into hyperextension, the olecranon serves as a fulcrum and focuses the stress on the distal humerus causing fracture[12]. Rarely flexion-type supracondylar fracture is observed as a result of a fall directly onto a flexed elbow. The extension type of fractures were further classified by using Gartland's classification and it was seen that 56.41% cases were of type II class whereas 33.33% cases were of type IIIa class. In the presents study we encountered 3 cases (7.5%) in which radial pulse was not palpable before reduction. In those cases, we reduced fracture by closed method and 'K' wire fixation was done. Patients were monitored closely for radial pulse and capillary filling. In all cases, radial pulse became palpable after reduction. Shaw *et al.* reported 11.9% children having weak pulsations in their study. Nerve injury was observed in total two (5%) cases. Out of them one case was ulnar nerve injury and other was radial nerve injury. We found no case of median nerve injury. Wilkins *et al.*[7] in their study found 7% incidence of nerve injury out of which 3.15% are radial, 1.61% were unlar nerve and 2.24% were median nerve injuries. Cramer *et al.*[13] found higher incidence of nerve injuries (15%) in their study. Boyd and Attenbourgh[14] had 4.3% incidence of nerve injuries. Out of that, 2.4% were radial, 0.4% were ulnar and 1.5% were medial nerve. In a Weiland *et al.*[15] series of 52 cases he came across five preoperative neurological deficits. Two patients had combined radial and median nerve and one each of radial, ulnar and median nerve deficit. Thus vide variation was observed in incidence of different nerves in various series.

CONCLUSION

Supracondylar fracture of humerus is commonest elbow injuries in age group of 6 to 11 years with higher proportion of male children. Left sided extension type of injury was common with Gartland's classification class II.

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