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Research Article

Fracture pattern of Supra condylar humeral fractures in children and lifestyle factors affecting it–Institutional study

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Abstract: The present study was done Tertiary care centre to find the fracture pattern of supracondylar fractures humerus in children and life style factors affecting. Data was collected from parents/guardians fifty clinically and radiologically confirmed cases of supracondylar fractures of humerus in children up to fifteen years of age regarding following parameters1. Age 2.Sex 3. Extremity involved (dominant or non-dominant) 4. Mode of trauma 5.Time since injury 6.Anatomical type of fracture (extension or flexion type) 7.Previous treatment taken 8.Gartland type of fracture 9.Associated injuries 10.Complications at presentation.The data was tabulated and analysed using appropriate statistics. The average age of presentation of these fractures was found to be 7.34 years. Male children were found to be at higher risk of fractures than females. The commonest mode of injury of supracondylar fractures in this study was fall from stairs .The mean delay in presentation was 0.76 days (18.2 hours). 14% of the patients had taken previous treatment from local bone setters in the form of massage or splint age.This study has helped usto work out factors that are preventable and need attention to decrease the morbidity of one of the most frequent injuries in children. Among these need of railing of the stairs and discouraging the treatment from local bone setters need to be addressed urgently.
Keywords: Supracondylar fractures, Humerus, Gartland, Extension type, Orthopaedic, Local bone setter

INTRODUCTION

Fractures are one of the leading causes of morbidity and mortality in children [1]. The supracondylar fracture comprises about 58% of the elbow fractures in children [2]. The common age group is 5-10 years at this peak age for the supracondylar fractures there is naturally occurring hyperextension at the elbow which predisposes the distal humerus to this type of fracture [3]. The metaphysical area of the distal humerus is the weakest area around elbow. This super imposed on the frequency of falls in small children while playing on ground, cycling or fall from household objects like bed, sofa etc is the factor responsible for the common occurrence of this fracture in children.

Even though several genetic, endocrine, or systemic illnesses that affect bone metabolism may cause fractures, the majority of children with fractures are otherwise healthy. Several factors have been analysed for their role in determining fracture risk. Bone mass and bone mineral density, low calcium intake, high body mass index (BMI), inactivity, behavioural difficulties, consumption of carbonated beverages, use of drugs (corticosteroids) have been variably associated with this kind of injury in children [4-8].

The fracture pattern and lifestyle factors varies between communities as a result of differences in socioeconomic, cultural, degree of urbanisation and other population characteristics [9, 10, 11]. Similar studies of this type has been done in hilly areas of India [12], but no such study has been done in plains of North India .Our aim of the study was to identify the lifestyle factors responsible for supracondylar fractures in children so that counselling regarding preventive strategies can be introduced at the earliest and incidence and complications associated with these fractures can be reduced.

MATERIAL AND METHODS

The study was done in children age 2-15yrs who reported during one year in emergency or Out Patient department of a tertiary care hospital in the plains of North India over a period of one year. The fracture was clinically evaluated and confirmed radio graphically at the time of injury. Prior consent was taken from institutional ethical committee and written

informed consent was obtained from all parents or legal guardians. Following parameters were recorded: 1. Age, 2. Sex, 3. Extremity involved (dominant or non-dominant), 4.Mode of trauma, 5.Time since injury, 6.Anatomical type of fracture (extension or flexion type), 7.Previous treatment taken,8.Gartland type of fracture, 9. Associated injuries, 10. Complications at presentation. Cases of pathological fracture and fracture due to severe trauma were excluded from the study. Even children known to be suffering from any specific pathologic process or taking treatment known to affect bone and mineral metabolism were also excluded from the study. Fractures that were initially diagnosed as supracondylar fractures on the basis of suspicion and later turned out to be simple soft tissue injuries or some other pattern of bone injury were also excluded from the study. The values of above mentioned parameters were found, analysed and expressed as averages and percentage.

OBSERVATION AND RESULTS

The results of this study are summarized in tables and figures given below: The maximum number of cases was in the age group of 8-10 years and more than 60% of the patients were 5-10 years of age. The average age of supracondylar fractures was calculated as 7.34 years. A male dominance was seen where twenty (82%) children were males and only five (18% were females) Left side involvement was more than right side involvement in supracondylar fractures.58% of the total had non dominant left limb involvement.

Table 1: Patient Demographics

Age group in years	Number of cases
2 - 4	10(20%)
5 – 7	12(24%)
8- 10	20(40%)
11 - 13	8(16%)
Sex	
Male child	41(82%)
Female child	9(18%)
Side involved	
Left side	29(58%)
Right side	21(42%)

Most of the fractures result from fall from stairs 38% followed by fall from stairs and 28% fall from bicycle.

Most of the cases reported on same day 62%. Most of the cases reported for treatment on the same day. Rest all the cases came for treatment within 7 days of the injury the mean delay in presentation was 0.76 days(18.2 hours).

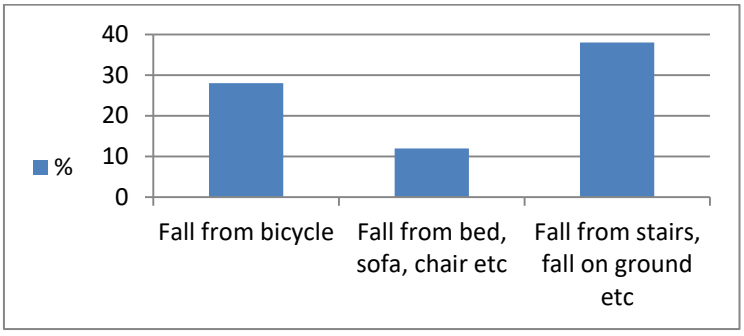

Fig-1: Mode of injury of supracondylar fractures of humerus

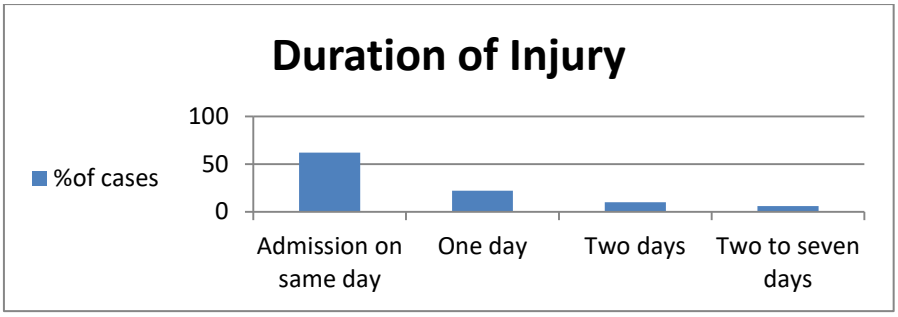

Fig-2: Delay in presentation to hospital after injury

14% had previously taken the treatment in the form of splint age and massage from the local bone setters.98 % of the fractures was simple. Only one case (2%) was of open type.

Table 2: Fracture Demographics

A-Nature of injury	**Number of cases.**
Simple	49(98%)
Compound	12(**%)**
B-Type of previous treatment taken	
Nil	43(86%)
Massage and/or splint age	7(14%)
C-.Anatomical type of fracture	
Extension type	48(96**%**)
Flexion type	2(4%)
D-Gartland Type of fracture:	
Gartland's type I	-
Gartland's type II	48
Gartland's type III	46(92%)

Table 3: Complications and associated injuries at the time of presentation to the Hospital

Type of complication	**No. of cases**
1. Nil	38(76%)
2. Weak radial pulse	5(10%)
3. Neurological Complication	7(14%)
Associated injuries	**No. of cases**
Puncture wound over same forearm	2(8%)
2. Wound on ipsilateral leg	2(8%)
3. Fracture of both bones forearm same side	2(8%)
4. Abrasion over the face	1(4%)
. Abrasion on the knee same side	1(4%)
6. Fracture radius same side	1(4%)

96% of the fractures were of extension type except two cases (4%) which were of flexion type. Only 5 cases had weak radial pulse and 7 had had neurological complication but the other patients had no other complication

DISCUSSION

Supracondylar fracture of the humeral bone is one of the most common injuries of the elbow joint in children. This study documents the fracture pattern and various life style factors of supra condylar fractures of humerus in children reporting in Tertiary care hospital in North India. The eldest patient who came for treatment was of twelve years and the youngest patient was of two years. Children < 2 years of age were not included because the analysis of lifestyle behaviours is hardly applicable at this very young age.60% of the patients were 5-10 years of age. The average age in our series was 7.34 years. Most of the studies done in the past had reported the average age of the patients about 7 years. [13,14]At this median age of peak incidence for supracondylar fractures (7.5 years), the bone is

undergoing remodeling, with a decrease in both antero-posterior and lateral diameters and hence is less cylindrical when compared to that of an adult and is thus prone to fracture. With increasing age as the humerus matures, the osseous epiphyseal centres fuse with widening of the humeral structures both medially and laterally, increasing the resistance to stress and probably accounts for the decrease in incidence of fractures.

In our study 82 % of the patients were males. Similar male predominance of 77.2% and 77.3% has been observed in other studies [14, 15].This could be attributed to the fact that males children because of being inherently naughty and careless than the male children are more prone to injuries. Boys have been found to participate in vigorous physical activity or contact sport which does increase bone mass, but it does not decrease the risk to such fractures [16].The lower incidence in females in some cases maybe because female children are usually less permitted outdoors on bicycle.

It was observed that left side humeral involvement was more than right side involvement .58 % of the total 50 patients had left side involvement. Similar studies conducted in series of 132 and 403 cases reported non- dominant side to be more frequently injured[17,18].The probable reason of this is that the right arm has a greater bone mass than the more sedentary left arm and hence is less prone to fractures .A study of 22 cases reported in contrast more frequent involvement of right side with right limb fractured in 14 cases while left limb injured in 8 cases[14].

The commonest mode of injury in both the groups was fall from stairs and fall while playing. It has been observed that people living in this area in plains prefer to live on ground floor and have single storeyed houses. The stairs are to the roof are incomplete or lack a railing and may be reason for more number of such injuries .Most of the cases reported for treatment on the same day. Rest all the cases came for treatment later, but within 7 days of the injury. The mean delay in presentation was 0.76 days(18.2 hours). In similar studies of supra chonylar humeral fractures done in the past longest delay observed was 24 hours,34 hours,48 hours respectively. [17, 20, 21]. Thus the difference in average delay in presentation might be due to accessibility and distance to the hospital. Awareness, literacy level, socio- economic status and belief in treatment by local quacks of the parents may explain the variability in the presentation time to the hospital.

It has been observed that majority of the supracondylar fractures of humerus are almost always closed fractures. Our study reported also reported only one case (2%) of open type. Similar studies done earlier in 132 cases and 119 cases of supra condylar humeral fractures reported only and four cases respectively [17, 22].Only 8% of the cases of supracondylar humeral fractures in our study were of flexion type. Similar results that flexion type injuries are uncommon and only 4 % cases of cases were flexion type were observed in previous studies on supracondylar fractures.[23, 24]The extension type of fractures when further classified according to Gartland's classification. Most of the children had Gartland's type III fractures (88%), and only (8%) had Gartland type II fractures. The Gartland's type III fractures are also found to be more frequent in reported series of other authors [25].

14% of patients had treatment in the form of splint age and massage from the local bone setters. A study reported treating fifteen children who presented late due to initial handling by traditional practitioners. [26]This is quite expected due to the large number of unqualified traditional bone setters present in our area of study and the ignorance and illiteracy prevalent among the population make the children victims of these quacks.

Incidence of neurological complication was 14% injuries in five patients while weak radial pulse was present in 10% of the patients at the time of presentation. Similar results were reported23(14%) nerve injuries in their review of 162 supracondylar fractures of humerus in children[27].Vascular compromise in the form of weak radial pulse was present in 10% of cases in one of the studies[2]. Another study also reported 5 % incidence of vascular insufficiency.[28]The incidence of vascular complications in these studies could be due to delay in presentation and massages given to the elbow by quacks which aggravate the soft tissue injury and thus swelling causing pressure over the vessels..

98 % of the fractures were simple.20% of the patients had associated injury. Only two cases had ipsilateral fracture of both bones forearm on ipsilateral side and one case had ipsilateral fracture of radius. Only six patients had minor soft tissue injuries incidence of ipsilateral fracture of forearm bones is 6 %. The incidence of fracture of combination of forearm fracture with supracondylar to be rare in other studies also [15]. There was also no bony injury in contra lateral upper limb which coincides with our observations [29]. Incidence of soft tissue injuries has not been reported much in literature because it is seldom given much importance as these heal without sequelae.

CONCLUSION

Supracondylar fractures in this region has peak incidence from 4 to 8 years of age with boys having a higher frequency than girls. Ipsilateral fractures of forearm bones is associated with supracondylar

fractures in a fall from higher level and patients with supracondylar fractures should always be screened clinically as well as radiologically for such injury. The treatment by local bone healers should be discouraged by doing awareness campaigns in the area. as it may give rise to various neurological complications and may delay union of these fractures. The safety precautions which can be implemented in homes of young children and at playgrounds to avoid these fractures should be also shared by Health professionals and the Government through social media.

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