

## STUDY OF EPIDEMIOLOGY OF ELBOW FRACTURES IN CHILDREN AT A TERTIARY HOSPITAL

Arpan Bijyal<sup>1</sup>, Manoj Kumar<sup>2</sup>, Shubam Surmal<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Orthopedic, GMC Doda, Jammu and Kashmir, India.

<sup>2</sup>Senior Resident, Department of Orthopedic, GMC Doda, Jammu and Kashmir, India.

<sup>3</sup>Senior Resident, Government Medical College, Jammu, India.

Received : 21/10/2022  
Received in revised form : 25/11/2022  
Accepted : 06/12/2022

**Keywords:**

Elbow fractures, children, accidental falls, hyperextension of the elbow, supracondylar location.

**Corresponding Author:**

**Dr. Arpan Bijyal,**  
Email: arpan100b@gmail.com  
ORCID: 0000-0002-4909-5309

DOI: 10.47009/jamp.2022.4.5.151

Source of Support: Nil,  
Conflict of Interest: None declared

*Int J Acad Med Pharm*  
2022; 4 (5); 724-727



### Abstract

**Background:** Children often present at the emergency department with suspicion of a fracture in the elbow. These fractures consist of supracondylar, lateral condyle, neck of radius, medial epicondyle, olecranon, head of radius and intercondylar fractures. Present study was aimed to analyse the various epidemiological parameters like age, gender distribution, presentation, mechanism of injury and associated complications in children with elbow fractures. **Material and Methods:** Present study was retrospective study, conducted case records of children 1-12 years, admitted with diagnosis of elbow injury, underwent treatment at our hospital from January 2019 to December 2021 (3 years). **Results:** In present study, 138 children admitted with diagnosis of elbow injury, underwent treatment at our hospital were studied. Mean age was  $7.6 \pm 3.3$  years. Majority children were boys (68.12 %), involved left side (61.59 %), non-dominant arm was involved (65.94 %), presented within 48 hours (64.49 %). Common circumstances for elbow fracture in children were recreational accident (48.55 %), less common were domestic accident (17.39 %), fall from height (16.67 %), sports (13.04 %) & road accident (4.35 %), Majority were closed fractures (94.93 %), common locations were supracondylar (57.97 %), others were head of radius (10.14 %), lateral condyle (7.97 %), olecranon (7.25 %), neck of radius (6.52 %), medial epicondyle (5.07 %), inter condylar (2.90 %) & mix (2.17 %). **Conclusion:** Elbow fractures in children commonly occur from accidental falls while children are at play, typical mechanism involves a fall on the outstretched hand and hyperextension of the elbow resulting in a fracture supracondylar location.

## INTRODUCTION

Because children tend to fall with their out-stretched arms, fractures of the upper extremity are common. Children often present at the emergency department with suspicion of a fracture in the elbow. Approximately 28% of all paediatric fractures are elbow fractures.<sup>[1]</sup> These fractures consist of supracondylar, lateral condyle, neck of radius, medial epicondyle, olecranon, head of radius and intercondylar fractures. Elbow fractures are rarely life-threatening, but may have serious complications, including neurovascular injuries, cubitus varus deformities, and Volkmann's contractures in supracondylar fractures; nonunion, valgus deformities, and late ulnar nerve palsies in lateral condyle fractures.<sup>[2]</sup> Due to the unique nature of pediatric elbows, occasionally diagnosis is difficult and some injuries are often missed unless careful radiological assessment is made. The

standard method of imaging are radiographs in anteroposterior and lateral directions to detect a potential fracture. Possible modalities for treating these kinds of fractures are: skeletal traction, closed reposition followed by cast immobilization, percutaneous pinning following open/closed reposition, and open reposition followed by inner fixation.<sup>[3]</sup> Present study was aimed to analyse the various epidemiological parameters like age, gender distribution, presentation, mechanism of injury and associated complications in children with elbow fractures.

## MATERIAL AND METHODS

Present study was retrospective study, conducted in Department of Orthopedic, GMC, Doda, Jammu and Kashmir, India. Case records of children 1-12 years, admitted with diagnosis of elbow injury, underwent treatment at our hospital from January 2019 to December 2021 (3 years) were studied. Children

with prior history of elbow fractures were excluded from study. Study approval was obtained from institutional ethical committee.

Various epidemiological parameters such as age, sex, injured side, fracture type (flexion/extension), fracture classification, presentation (time after

injury), nerve injury, vascular injury, open/closed injury, and associated injuries were noted in proforma. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

## RESULTS

In present study, 138 children admitted with diagnosis of elbow injury, underwent treatment at our hospital were studied. Mean age was  $7.6 \pm 3.3$  years. Majority children were boys (68.12 %), involved left side (61.59 %), non-dominant arm was involved (65.94 %), presented within 48 hours (64.49 %).

**Table 1: General characteristics**

Characteristics	No. of patients	Percentage
Mean age (mean $\pm$ SD)	$7.6 \pm 3.3$ years	
Gender		
Female	44	31.88%
Male	94	68.12%
Side		
Right	53	38.41%
Left	85	61.59%
Dominant arm	47	34.06%
Non-dominant arm	91	65.94%
Presentation		
Within 48 hours	89	64.49%
48 hours to 1 week	38	27.54%
More than 1 week	11	7.97%

We noted that common circumstances for elbow fracture in children were recreational accident (48.55 %), less common were domestic accident (17.39 %), fall from height (16.67 %), sports (13.04 %) & road accident (4.35 %),

**Table 2: Circumstances of occurrence**

Circumstances	No. of patients	Percentage
Recreational accident	67	48.55%
Domestic accident	24	17.39%
Fall from height	23	16.67%
Sports	18	13.04%
Road accident	6	4.35%

Clinical characteristics noted were combination fractures (10.14 %), pink pulseless warm hand (5.07 %), with pale/cold limb (1.45 %), with compartment syndrome (1.45 %) & with nerve injury (6.52 %).

**Table 3: Clinical characteristics**

Characteristics	No. of patients	Percentage
Combination fractures	14	10.14%
Pink pulseless warm hand	7	5.07%
With pale/cold limb	2	1.45%
With compartment syndrome	2	1.45%
With nerve injury	9	6.52%

In presents study, majority were closed fractures (94.93 %), common locations were supracondylar (57.97 %), others were head of radius (10.14 %), lateral condyle (7.97 %), olecranon (7.25 %), neck of radius (6.52 %), medial epicondyle (5.07 %), inter condylar (2.90 %) & mix (2.17 %),

**Table 4: Type of Fracture**

Type of Fracture	No. of patients	Percentage
Open fractures	7	5.07%
Closed fractures	131	94.93%
Fracture location		
Supracondylar	80	57.97%
Head of radius	14	10.14%
Lateral condyle	11	7.97%
Olecranon	10	7.25%
Neck of radius	9	6.52%
Medial epicondyle	7	5.07%
Inter condylar	4	2.90%
Mix	3	2.17%

## DISCUSSION

Supracondylar humerus (SCH) fractures are classically associated with falls from playground equipment onto an outstretched, nondominant hand, and are believed to be more common among boys than among girls.<sup>[4]</sup> The complex shape of this joint (Elbow) and its associated vascular & nerve structures and the sparse soft tissue envelope combine to make these fractures difficult to treat. The intimate location of neurovascular structures often results in a spectrum of injuries with associated complications (Cubitus varus, neurovascular injuries, and Volkmann ischemic syndrome) and potential long-term disabilities.<sup>[5]</sup>

Behdad A et al.,<sup>[6]</sup> noted that in children with elbow fractures, mean age was  $8.1 \pm 2.31$  years, boys were injured 2.6 times more often than the girls. Falling was the major cause of pediatric elbow fractures (86%). Supra condylar were the most common type of fracture. There was a significant association between gender and type of injury ( $P < 0.01$ ).

Shamim Bhat et al.,<sup>[7]</sup> noted that annual incidence of elbow fractures 31.51% of all fractures, average age was 6 years. Majority were of age group 4 to 6 years, males (72 %), had left side involved (70 %). Supracondylar fractures constituted 65% of all fractures. Most common mechanism of trauma was due to fall in recreational accidents (90%). Compound fractures constituted 2% of all fractures and the associated lesions were present in 5% of cases. Most of the associated injuries were fractures of the distal forearm (44%) and mid forearm(20%). Rest associated fractures included fracture clavicle (15%), proximal humerus (14%), hand (5%) and scapula(2%)

In study by Towseef Bhat et al.,<sup>[8]</sup> supracondylar was the most common fracture in 58.7% of patients followed by lateral condyle and proximal radius fracture. The highest number of fractures were reported in the age group of 5 to 8 years. In addition, 19% of patients presented with associated complications, 8% of patients had combination injuries of the ipsilateral upper limb, 16% of patients presented to the hospital 1 week after the trauma, 48% of patients had the first contact with a bonesetter/native practitioner.

Sananta P et al., studied 99 elbow fracture, 62 were male (63%), mean age was 7.3 years. Most cases are supracondylar fracture (78%). The supracondylar fracture is composed of 17 fracture classified to type II, and 60 fracture to type III as classified by Gartland. The most common etiology of fracture is associated with sports, recreational activities, and fall from height of less than two meters. Nerve injury involving the median, radial, and ulnar nerve is seen in eight patients with type III supracondylar fracture. Associated brachial artery injury is seen in four patients with type III supracondylar fractures. A group of 78 patients (79%) were treated surgically and 21 patients (21%) were treated conservatively.

Kuloor SB et al.,<sup>[10]</sup> study yielded excellent results in 92% of patients (mayo elbow performance score  $>90$ ). There was no major difference in clinical outcome between two groups of patients. Complications like instability and non-union not seen following surgical fixation with K wires. The mean loss of flexion, extension, supination, and pronation was 4, 5, 3 and 2 degrees respectively with elbow dislocation group and 2, 3, 1, 1 in without dislocation group. Pre op instability seen in 54% patients was absent in follow up period. Stiffness was more in elbow dislocation group but overall performance was almost equal. Surgical fixation of medial epicondyle fractures yields excellent results and may be advisable when indicated.

Delay in management may lead to failure of closed reduction and percutaneous pinning and delayed open reduction is plagued with higher risk of myositis ossificans. Local bone setters and healers are still prevalent in developing countries and their intervention in these fractures leads to delay in presentation to hospital and additional set of complications like compartment syndrome, Volkmann's ischemic contracture, myositis, malunion and even limb threatening complications like gangrene.<sup>[11,12]</sup>

The optimal timing of surgery for uncomplicated displaced supracondylar fractures remains controversial.<sup>[13]</sup> Prompt reduction on an emergency basis is usually advocated, as the absence of oedema initially facilitates fracture reduction and decreases the risks of perioperative complications (compartment syndrome, infection, and iatrogenic nerve injury) and conversion to open surgery.<sup>[14]</sup> However, several studies indicate that delayed treatment does not increase the morbidity rate.<sup>[15]</sup>

## CONCLUSION

Elbow fractures in children commonly occur from accidental falls while children are at play, typical mechanism involves a fall on the outstretched hand and hyperextension of the elbow resulting in a fracture supracondylar location.

## REFERENCES

1. Hussain, S.; Dar, T.; Beigh, A.Q.; Dhar, S.; Ahad, H.; Hussain, I.; Ahmad, S. Pattern and epidemiology of pediatric musculoskeletal injuries in Kashmir valley, a retrospective single-center study of 1467 patients. *J. Pediatric Orthop. B* 2015, 24, 230–237.
2. Okubo H, Nakasone M, Kinjo M, Onaka K, Futenma C, Kanaya F. Epidemiology of paediatric elbow fractures: a retrospective multi-centre study of 488 fractures. *J Child Orthop* 2019;13:516-521
3. Aktekin CN, Toprak A, Ozturk AM, Altay M, Ozkurt B, Tabak AY. Open reduction via posterior triceps sparing approach in comparison with closed treatment of posteromedial displaced Gartland type III supracondylar humerus fractures. *J Pediatr Orthop B*. 2008 Jul; 17(4): 171-8.

4. Cheng JC, Lam TP, Maffulli N. Epidemiological features of supracondylar fractures of the humerus in Chinese children. *J Pediatr Orthop B* 2001;10:63-7.
5. Milbrandt TA, Copley LAB. Common elbow injuries in children: evaluation, treatment, and clinical outcomes. *Curr Opin Orthop*.2004;15(4):286-94.
6. Behdad A, Behdad S, Hosseinpour M. Pediatric Elbow Fractures in a Major Trauma Center in Iran. *Arch Trauma Res*. 2012; 1(4): 172-5.
7. Shamim Ahmad Bhat1, Raja Rameez Farouqi, Mehmood Ul Hassan, Tabish Tahir Kirmani, Khurshid Ahmad Kangoo, Asif Nazir Baba, Epidemiological analysis of elbow fractures in kashmiri children, *Indian Journal of Orthopaedics Surgery* 2016;2(1):48-51
8. Towseef Ahmad Bhat, Manik Sehgal, Rajiv Kapila, Rubinder Kaur, Rajan Singh Negi Epidemiological Evaluation of Pediatric Elbow Injuries: A Retrospective Observational Single Center, *International Journal of Recent Surgical and Medical Sciences* Vol. 8 No. 1/2022
9. Sananta P, Sintong L, Prasetyo B, Putera MA, Andarini S, Kalsum U, Suryanto Dradjat R. Elbow Fracture in Children at Saiful Anwar General Hospital, Nine Years Experiences. *Open Access Maced J Med Sci*. 2019 Dec 15; 7(23):4069-4071
10. Kuloor SB, Shareef AJ, Sudeep A. Medial epicondyle fractures in children: a study of functional outcome of surgical fixation. *Int J Res Orthop* 2019;5
11. Onyemaechi NOC, Onwuasoigwe O, Nwankwo OE, Schuh A, Popoola SO. Complications of Musculoskeletal Injuries Treated by Traditional Bone Setters in a Developing Country. *Indian J App Res* 2014; 4(3):313-16.
12. Salati SA, Rather A. Bonesetter's Gangrene of Hand - A Preventable Disaster. *J Surg Pak (Int)* 2009; 14(3):143-44.
13. Leet AI, Frisancho J, Ebramzadeh E. Delayed treatment of type-3 supracondylar humerus fractures in children. *J Pediatr Orthop* 2002;22:203-7.
14. Iyengar SR, Hoffinger SA, Townsend DR. Early versus delayed reduction and pinning of type III displaced supracondylar fractures of the humerus in children: a comparative study. *J Orthop Trauma* 1999;13:51-5.
15. Cashman JP, Guerrin SM, Hemsing M, McCormack D. Effect of deferred treatment of supracondylar humeral fractures. *Surgeon* 2010;8:71-3.