

Elbow Fracture in Children at Saiful Anwar General Hospital, Nine Years Experiences

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Abstract

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AIM: The frequency, incidence, and types of fracture of the elbow are different between children and adult. The epidemiology of elbow fracture in children has been the subject of a limited number of studies. This study aims to observe the pattern of elbow fractures in children 18 years of age and younger, during a nine years period.

METHODS: This is a retrospective study about elbow fracture cases in children 18 years old and younger treated in Saiful Anwar General Hospital Malang in the period of June 2009 until December 2018. The data obtained from the medical record include the age at the time of accidents, fracture site, type of lesion and ipsilateral injuries, time of accidents, and the mechanism of injury.

RESULTS: There is a total of 99 elbow fracture, and there are 62 male (63%) and 37 female patients (37%). The mean age for the entire group is 7.3 years (8.1 years for male and 7.1 years for female). Most cases are supracondylar fracture (n = 77, 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.

CONCLUSION: The incidence of elbow fracture in children treated in Saiful Anwar General Hospital during a nine years period is 99 patients, with supracondylar fracture Gartland type III being the leading type of this group. Male patients are more common than female patients. Nerve injury was seen in 13.33% of cases and brachial artery injury was seen 6.67% with type III supracondylar fracture. Most of the elbow fracture in our institution were treated operatively.

Introduction

Upper extremity fracture made up 65-75% of all children fractures and 8-10% of it involve the elbow region. Elbow fracture in pediatric patients is a great encumbrance treated in a trauma hospital [1]. The total incidence of elbow fractures was 30.8/10000 each year [2]. The majority of injury mechanism comes from fall in an outstretched hand [3].

The complications of elbow fractures include malunion or nonunion of the fracture fragments, stiffness, and neurovascular injury especially the ulnar nerve [4]. Determination of the etiology is important because children's activities are different in each country [2].

There is currently no study about the epidemiology pattern of the elbow in Indonesia, thus we present our study about the epidemiology of elbow fracture pattern in children treated in our institution in nine years of periods from June 2009 until December 2018.

Methods

The data of all elbow fractures in children aged 18 years old and younger treated in Saiful Anwar General Hospital Malang in a nine years period of June 2009 to December 2018 were obtained from the medical records. This is a retrospective and descriptive epidemiology study about elbow fracture patterns in pediatric patients. Personal data consisting of age at the time of accidents, fracture sites, type of lesion and ipsilateral injuries, time of the accident and the mechanism of injury were collected and analyzed.

The inclusion criteria are: (1) all elbow fracture cases treated in Saiful Anwar General Hospital Malang whether an outpatient or inpatient care (2) patient with age 18 years old and younger. The exclusion criteria are: (1) patient refused to be treated at our hospital (2) patient who deceased before receiving definitive treatment (3) patient with incomplete data required for this study. No funds were used for the design and conduction of the study; collection, management, analysis, and interpretation of the data; and preparation of the manuscript.

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Results

There were a total of 99 elbow fractures patients meeting the criteria of inclusion; 62 fractures (63%) occurred at male patients and 37 fractures (37%) occurred at female patients (Table 1). Most cases were supracondylar fracture (n=77, 78%).

Table 1: Total number of elbow fractures cases based on gender

Elbow Fractures	
Girl 37%	Boy 63%

Table 2 shows that from 77 supracondylar fractures, 17 were classified as Gartland type II, and 60 were classified as Gartland type III.

Table 2: Number of elbow fractures cases further classified using classification by Gartland

Elbow Fractures			
Supracondylar Gartland II 17	Supracondylar Gartland III 60	Intercondylar 8	Others 14

The most common etiology of fracture is associated with sports and recreational activities and a fall from a height less than two meters. Nerve injuries involving the median, radial, and ulnar nerves

were seen in eight patients with Gartland type III supracondylar fracture as we can see in Table 3.

Table 3: Number of associated vascular and nerve injury in supracondylar fractures Gartland type III

Supracondylar Fractures Gartland type III		
Bony Fractures 48	Associated Nerve Injury 8	Associated Vascular Injury 4

Associated vascular injuries happened in four patients with Gartland type III supracondylar fractures. From Table 4 we can see that 78 fractures (79%) were treated surgically and 21 fractures (21%) were treated conservatively.

Table 4: Number of elbow fractures cases treated operative and non-operative

Elbow Fractures Treatment	
Operative 78	Non-Operative 21

Discussion

From the distribution according to sex in previous study from Esen and Sapmaz and Anjum *et al.*, male patients sustained more elbow fractures compared than female patients [5], [6]. This is in line with the result of our study in which the male patients dominantly suffered elbow fractures than the female patients while a retrospective study about pediatric elbow fractures conducted by Emery *et al.* showed no differences in the demographic pattern of sex [7].

In this study we divide the elbow fractures patients into four classification of Gartland type II and III, intercondylar, and other type which do not fulfill any of the previous classification. Gartland classification is utilized for the description and orthopaedic management of supracondylar fracture [8]. Gartland type I is a nondisplaced or minimally displaced fracture which is managed conservatively with immobilization. Gartland type II is a displaced fracture with intact posterior cortex and is managed by closed reduction or closed reduction with percutaneous pinning decided by degree of displacement. Gartland type III fracture is defined by complete displacement of fracture with complete cortical disruption of distal humerus. This is commonly managed with closed reduction and percutaneous pinning, and if it fails or there is concurrent brachial artery injury, open reduction is indicated [9]. Gartland type III supracondylar fracture is the commonest type of injury with 60 cases out of 99 patients in our study. It is in majority being the extension type fracture with a common complication such as Volkmann contracture and bone deformity [10]. Similar result about the occurrence of supracondylar fractures is reported by Okubo *et al.* in the study about pediatric elbow

fractures. It is reported that the number of supracondylar fractures is the most compared to other elbow fracture in pediatric population with 214 cases from the total of 488 patient populations [2].

From 60 patients sustaining Gartland type III supracondylar fractures, it was found that eight patients suffered a nerve injury (13%). It is analogous with some previous studies which showed that the nerve injury associated with supracondylar fractures is ranging from 6.4-25% [11], [12], [13]. The most commonly nerve to be injured in this fracture is the ulnar nerve [4].

The majority of our patients were treated surgically (78 cases). High surgical rate is associated with displaced supracondylar fractures Gartland type III and fractures with neurovascular compromise which need open reduction and exploration surgery. Surgery was chosen to achieve good alignment and to avoid the late complication of elbow deformity such as cubitus varus or 'gunstock deformity'. Conservative treatments were chosen primarily in nondisplaced and isolated elbow fracture which stabilized by immobilization. This is in contrast with the previous epidemiology study from Houshian *et al.* which applied a much more conservative method for the treatment of the elbow fracture in children [14], but in line with the study investigated by Okubo *et al.* [2] in the term of higher operative rate for Gartland type II and type III supracondylar fractures (50% and 100% operative rate). In this study, the most common injury is Gartland type III, thus the operative method rate is higher.

In conclusion, pediatric elbow fracture is a common injury caused by fall on an outstretched hand. Supracondylar humeral fracture Gartland type III is the most common classification sustained by patients with elbow fractures and the possibility of neurovascular compromise is always have to be remembered.

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