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An Autopsy Based Study of Clavicle Fractures at IGIMS, Patna: A Retrospective Autopsy Study

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Abstract
The clavicle is the first bone in the human body to begin intramembranous ossification directly from mesenchyme during the fifth week of fetal life. Clavicle fractures are frequent injuries in adults (2-5%) and children (10-15%) and represent 44-66% of total shoulder fractures. Clavicular injuries affect 1 out of 1000 people per year. Ossification occurs between 12-19 years of age and fusion to the clavicle occurs between the age of 22-25. This retrospective study is undertaken to examine the epidemiology of clavicle fractures. To classify clavicle fractures Allman classification was used. In our study male constitutes 80% and female 20%, left hand side clavicular fractures in 70% of cases and 30% for the right-hand side, sternal part of clavicle fractures in 60% of cases, middle part of clavicle fracture in 20% of cases, acromial part of clavicle fracture in 10% of cases and compound fractures in 10% cases. Clavicle fractures are also frequently seen in multiple traumatic injuries. In these situations, it is important to examine the patient for other associated injuries.
Keywords: *Clavicle Fractures, Allman Classification, Compound Fracture, Injury.*

Introduction

Clavicula means "key" and is the diminutive of clavis in Latin. The clavicle is the first bone in the human body to begin intramembranous ossification directly from mesenchyme during the fifth week of fetal life.

The medial growth plate is accountable for 80% of the length of the clavicle. Ossification occurs between 12-19 years of age and fusion to the clavicle occurs between age of 22-25 years.

Sternoclavicular dislocations in young patients are in fact epiphyseal fractures. The clavicle is S-shaped i.e. concave ventrally-laterally and convex ventrally-medially. It acts as a bony protection wall for the vessels and for the brachial plexus that are lying behind it. As the clavicle is S-shaped, it rotates upwards and backwards during elevation of the arm so that the front curvature clears the underlying structures and does not compress them under normal conditions.

The clavicle transmits the forces of the trapezius muscle to the scapula through the coraco-clavicular ligament, and simultaneously provides a bony framework for muscle origins and insertions which optimize the biomechanics of the shoulder under active movement of the arm[1]. Clavicle

fractures are frequent injuries in adults (2-5%) and children (10-15%) and represent 44-66% of total shoulder fractures[2]. Clavicular injuries affect 1 out of 1000 people per year. Bimodal incidence is seen in men younger than 25 years and older than 55 years of age. The annual incidence rate of clavicular fractures is estimated to be between 30 and 60 cases per 100,000 populations[3].

Aim and Objective

- To examine the epidemiology of clavicle fractures.

Material and Method

This retrospective study was conducted in the department of forensic medicine and toxicology, IGIMS, Patna from June 2017 to may 2019. Records of 60 clavicle fractures in autopsied cases were retrieved from department within the aforementioned period.

To classify clavicle fractures Allman classification was used[3].

Allman Classification:

- Group I-middle 1/3
- Group II-lateral 1/3 (acromial)
- Group III-medial 1/3 (sternal)

Neer made a revision to the Allman classification scheme. Group II (distal clavicle) fractures were further divided into 03 types based on the location of the clavicle fracture in relation to the coraco-clavicular ligaments. The designations are as follows:

Type I Fractures

Minimally displaced and occur lateral to an intact coraco-clavicular ligament complex; these fractures may be treated non-operatively and symptomatically

Type II Fractures

Occur when the medial fragment is separated from the coraco-clavicular ligament complex; the medial fragment is displaced cephalic by the pull of the sternocleidomastoid muscle, and the distal fragment is displaced caudally by the weight of the upper extremity, with the intact coraco-clavicular ligament complex; the resulting deformity leads to marked displacement of the fracture ends, predisposing this fracture type to a higher prevalence (up to 30%) of nonunion.

Type III Injuries

Minimally displaced or non-displaced and extend into the acromioclavicular (AC) joint; as with type I fractures, these injuries can be treated symptomatically; the development of late AC degenerative changes can be treated with distal clavicular excision.

Observations and Results

In this retrospective study of total 60 cases of clavicular fracture, male (80%) outnumbered the female (20%) (Table 1). Left sided clavicular fractures was observed in 70% of cases (Table 2). Sternal part of clavicle fracture was seen in 60% of cases, middle part of clavicle fracture in 20% of cases and acromial part of clavicle fracture in only 10% of cases and compound fractures in 10% cases (Table 3).

Table 1 Sex Wise Distribution of Cases

Sex	Numbers	Percentage
Male	48	80
Female	12	20

Table 2 Fracture Side Wise Distribution of Cases

Fractured Sites	Numbers	Percentage
Right	18	30
Left	42	70

Table 3 Fracture Site Wise Distribution of Cases

Fracture Location	Numbers	Percentage
Sternal	36	60
Middle	12	20
Acromial	06	10
Compound Fractures	06	10

Discussion

Since it is placed subcutaneous clavicle may get fractured easily, with the fracture frequently being an isolated injury. However, clavicle fractures are also readily seen in multiple traumatic injuries.

Clavicle fractures may occur by direct or indirect blow to the clavicle. The most prevalent

mechanism being indirect one, involving a fall directly onto the lateral shoulder during road traffic accidents. A direct blow from an iron rod or a direct fall onto the clavicle examplifies the mechanism of direct blow.

A lesser prevalent mechanism for clavicle fractures is fall onto an outstretched hand.

Gender

In our present study male comprised 80% and female comprised 20% of cases. Similar results were observed in study conducted by Honnungar et al[4]. Robinson et al[5] in their study found the male: female ratio to be 2.6:1. The reason for male predominance in clavicular fracture could be due to a greater involvement of males in contact and violent sports and motor vehicle accidents (MVAs). A smaller peak occurs in elderly patients, who tend to sustain clavicle fractures during low-energy falls[3].

In our study, we observed left sided clavicular fractures in 70% of cases and 30% for the right-hand side. Hill et al also reported a similar pre-dominance of injuries to left clavicle with a right-left distribution of 36.5% and 63.5%, respectively [6]. Nordqvist in his study reported right and left sided clavicular fractures with a frequency of 47.5% and 52.5%, respectively[7]. None of the cases had bilateral clavicular fracture in our study.

As observed in our study, sternal part of clavicle fractures was seen in 60% of cases, middle part of clavicle fracture in 20% of cases, acromial part of clavicle fracture in 10% of cases and compound fractures in 10% cases. In the studies done by Robinson and Nordqvist[5.7], they observed nearly 75% of the fractures to be located in the middle part of the clavicle. The acromial part was involved in about 25% of the fractures, while the sternal part was affected in only a few cases.

Kendall et al[8] reported a casuality from an isolated clavicle fracture from transection of the subclavian artery. The fatality may have been due unassisted and undetected injury to the subclavian artery. The injury to the subclavian artery was observed at autopsy only.

Conclusion

Clavicle fractures are very frequent and are easily recognized because of their unique anatomic position. Despite the non-lethal appearance of clavicle fractures, however, potential treatment hurdles and possible complications calls for careful attention to clavicular injuries.

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Conflict of Interest: None.

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