

## Original Research Paper

# Clavicle Fractures: A Retrospective Autopsy Study

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### Abstract

The clavicle is the first bone in the body to ossify, and it does so by intramembranous ossification. The medial growth plate is responsible for 80% of the length of the clavicle. 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 investigate and analyze the epidemiology of clavicle fractures. To classify clavicle fractures Allman classification was used. In our study male constitutes 84% and female 16%, left hand side clavicular fractures in 68% of cases and 32% for the right-hand side, sternal part of clavicle fractures in 64% of cases, middle part of clavicle fracture in 20% of cases, acromial part of clavicle fracture in 8% of cases and compound fractures in 8% cases. Clavicle fractures are also common in the context of high-energy injury or multiple traumatic injuries. In these situations, it is important to examine the patient for other associated injuries.

**Key Words:** Clavicle Fractures, Allman and Neer Classification, Trauma, Injuries

### Introduction:

**Clavicula** means "key" and is the diminutive of clavis in Latin, (in Greek it is cleido). The clavicle is the first bone in the body to ossify, and it does so by intramembranous ossification (fifth week of gestation).

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

Sternoclavicular dislocations in young adults are in fact epiphysial fractures. The clavicle is S-shaped i.e. concave ventrally-laterally and convex ventrally-medially.

The clavicle is not present in animals that use their forelimbs for standing. It acts as a bony protection for the vessels and for the brachial plexus.

As the clavicle is S-shaped it rotates upwards and moves backwards during elevation of the arm so the anterior curvature clears the underlying structures and does not compress them under normal conditions.

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DOR: 11.07.2014 DOA: 11.01.2015  
DOI: 10.5958/0974-0848.2015.00012.3

The clavicle transmits the supporting forces of the trapezius muscle to the scapula through the coraco-clavicular ligament, and it is also a bony framework for muscle origins and insertions which optimize the biomechanics of the shoulder under active movement of the arm. [1] In the United States the clavicle is the most frequently fractured bone in the body in childhood, accounting for 10-16% of all fractures in this age group.

Clavicular injuries affect 1 in 1000 people per year. Bimodal incidence occurs in men younger than 25 years and older than 55 years. The annual incidence rate of clavicular fractures is estimated to be between 30 and 60 cases per 100,000 populations. [2]

### Aim and Objective:

- To Investigate and analyze the epidemiology of clavicle fractures.

### Material and Method:

It is a retrospective study of 50 cases of clavicle fracture in autopsied cases at Jawaharlal Nehru medical college, Belgaum during 2010 to 2013 Years.

To classify clavicle fractures Allman classification was used. [2]

### Allman Classification:

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

Neer made a significant revision to the Allman classification scheme. Group II (distal clavicle) fractures were further divided into 3 types based on the location of the clavicle fracture in relation to the coraco-clavicular

ligaments. The reason for this modification was that distal clavicle fractures behave differently depending on the exact location of the injury. 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 50 cases of clavicular fracture, male (84%) outnumbered the female (16%). (Table 1) In our study, we found left hand side clavicular fractures in 68% of cases and 32% for the right-hand side. (Table 2)

We observed in this study sternal part of clavicle fractures in 64% of cases, middle part of clavicle fracture in 20% of cases, acromial part of clavicle fracture in 8% of cases and compound fractures in 8% cases. (Table 3)

### Discussion:

Because of its subcutaneous position, the clavicle may be fractured easily, with the fracture often being an isolated injury. However, clavicle fractures are also common in the context of high-energy injury or multiple traumatic injuries. In these situations, it is important to examine the patient for other associated injuries, such as rib fractures, scapula fractures, other fractures about the shoulder girdle, pulmonary contusion, pneumothorax, hemothorax, and closed head injuries.

Clavicle fractures may be caused by direct or indirect trauma. The most common mechanism is an indirect one, involving a fall directly onto the lateral shoulder during road traffic accidents.

Examples of a direct mechanism would be a blow from a hockey stick or a direct fall onto the clavicle. At-risk athletes include those in football, hockey, and soccer and those at risk for falling during roller skating, skiing, bicycling, or horseback riding.

A less common mechanism for clavicle fractures is a fall onto an outstretched hand.

#### Gender:

In our present study male constitutes 84% and female constitutes 16%. Robinson et al [3] found the male: female ratio to be 2.6:1. Nordqvist reported an annual incidence of clavicular fractures in men between 15-19 years at about 150 per 100 000 and in females about 50 per 100 000. [4]

Clavicular injuries occur 2.5 times more commonly in males than in females, reflecting a greater involvement of males in contact and violent sports and motor vehicle accidents (MVAs). Clavicle fractures, the most common of all pediatric fractures, can present even in the newborn period, especially following a difficult delivery. A large peak incidence occurs in males younger than 30 years due to sports injuries.

A smaller peak occurs in elderly patients, who tend to sustain clavicle fractures during low-energy falls. [2]

#### Fracture Side:

In our study, we found left hand side clavicular fractures in 68% of cases and 32% for the right-hand side. Nordqvist reported right and left sides being fractured with a relative frequency of 47.5% and 52.5%, respectively. [4]

Hill et al reported a pre-dominance of injuries of the left clavicle with a right-left distribution of 36.5% and 63.5%, respectively [5]. Bilateral clavicular fractures are rare. [6] There were no cases in our study.

#### Fracture location:

In this study we found sternal part of clavicle fractures in 64% of cases, middle part of clavicle fracture in 20% of cases, acromial part of clavicle fracture in 8% of cases and compound fractures in 8% cases.

The distribution of fracture location by anatomical site in study by Nordqvist and Robinson was about three out of four fractures located in the middle part of the clavicle. The acromial part was involved in about one out of four fractures, while the sternal part was affected in just a few cases. [3, 4]

In adults, clavicle fractures account for 2.6-5% of all fractures and 44% of all shoulder girdle injuries.–Middle third (group I) fractures account for 69-82% of all fractures of the clavicle, whereas distal third (group II) fractures

account for 12%, and medial third (group III) fractures occur in 6% of cases. [7] While the overwhelming majority of clavicle fractures are benign, there is a possibility of associated, life-threatening intra-thoracic injuries.

Kendall et al reported a fatality from an isolated clavicle fracture from transection of the subclavian artery [8] this was the first such reported case in the literature.

The fatality may have been due to the fact that the fall was not witnessed and the patient lay unassisted for an unknown period of time. The patient never regained spontaneous circulation, and the injury to the subclavian artery was diagnosed at autopsy.

The postmortem examination revealed a mid-clavicular fracture with transection of the subclavian artery. A 2.6-L hemothorax and damage to parietal and apical pleura were noted, but no other injuries were present.

Although this case is unique, it does emphasize the need to be aware of the potentially catastrophic complications of damage to the vascular structures in close proximity to the clavicle.

**Conclusion:**

Clavicle fractures are common and easily recognized because of their subcutaneous position. Fracture union usually progresses regardless of the treatment initiated. Despite the innocuous appearance of clavicle fractures, however, potential treatment difficulties and possible complications warrant careful attention to these injuries.

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**Table 1: Sex Wise Distribution of Cases**

Sex	Numbers	Percentage
Male	42	84%
Female	08	16%

**Table 2: Fracture Side Wise Distribution of Cases**

Fractured side	Numbers	Percentage
Right	16	32%
Left	34	68%

**Table 3: Fracture Site Wise Distribution of Cases**

Fracture location (%)	Numbers	Percentage
medial 1/3 (Sternal)	32	64%
Middle	10	20%
lateral 1/3 (Acromial)	04	08%
Compound fractures	04	08%