

## Original Research Article

# Revisiting the epidemiology of mid shaft clavicle fracture-recent and emerging trends

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**Received:** 04 May 2022

**Revised:** 18 May 2022

**Accepted:** 19 May 2022

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## ABSTRACT

**Background:** Clavicle fracture is a common injury involving upper limb. It accounts for 2.6-5% of injuries. Most common mechanism causing this injury is a fall on an outstretched hand. Clavicle fractures have a bimodal distribution with 1<sup>st</sup> peak in young active adult males less than 30 years of age. Second peak in elderly females with osteoporotic bones. The annual incidence is highest in male under 20 age group, decreasing with subsequent age groups. Road traffic accidents is another mode of injury which is becoming increasingly common for mid shaft clavicle fractures.

**Methods:** A prospective study was carried out over 12 months. A total of 126 patients met the inclusion criteria. The epidemiological data was collected at the time of presentation using standard case sheet proforma. Radiographic assessment was done for fracture classification.

**Results:** Mid Shaft clavicle fracture was most common in middle aged males (31-40 years) with right side being most commonly affected. Road traffic accidents was the most common cause of injury (62%). AO/OTA type 15B1 is the most common fracture morphology (45%). Most of the high energy road traffic accidents are associated with 15B3 type fractures while type 15B1 is more common in low energy mechanisms like ground level fall.

**Conclusions:** Mid shaft clavicle fracture is a common injury in young population. It is increasingly being associated with road traffic accidents. The number of comminuted fractures, which represent high energy injury mechanism has been on the rise due to increase in high velocity accidents.

**Keywords:** Clavicle fracture, Epidemiology, Radiographic assessment

## INTRODUCTION

Clavicle is the only long bone which is situated horizontally. It is the only bony strut connecting upper limb to the trunk. The clavicle varies in its cross section throughout its length. The outer third of the bone is flat while medial third is tubular with middle third being transition area for the two cross-sections. This makes middle third of the clavicle a weak link making it a fracture prone area. Fractures of the clavicle are common injuries of adults, accounting for about 2.6 to 5% of all injuries.<sup>1-4</sup> Mechanism of injury is either a direct blow to the anterior chest wall or by a fall on the outstretched hand.<sup>5</sup> Clavicular fracture has bimodal age distribution. First peak occurs in young active adult males less than thirty years of age.

Usually, they have a direct force applied to the shoulder as a result of a fall over the shoulder and less commonly by a fall over an outstretched hand. Second peak occurs in elderly females with osteoporotic bones. Annual incidence is highest in male under 20 age group, decreasing with subsequent age groups. The incidence in females is more constant, with peaks in teenage as well as elderly age group.<sup>6</sup>

### Objectives

This study was undertaken to evaluate the epidemiology of the mid shaft clavicle fractures and analyse the changing trends.

## **METHODS**

This prospective interventional study was carried out at a tertiary care hospital in Central India. Patients who presented to the institution with injury/trauma to mid-shaft clavicle were evaluated in detail, clinically and radiographically. This study was carried out over a period 12 months from Jan 2020 to Jan 2021.

### ***Study design***

Study design was of observational study.

### ***Sample size***

Estimated sample size for the study was 102.

Ethical clearance was taken from institutional ethical committee as per the institutional requirements.

### ***Statistical analysis***

Collected data were entered into Microsoft word spreadsheet. Tables and charts were prepared using Microsoft word and excel spreadsheet. Continuous variables (demographic, biochemical and hemodynamic parameters) were presented as mean  $\pm$  SD. Categorical variables were expressed in frequency and percentages. Statistical software STATA version 14.0 was used for statistical analysis.

### ***Inclusion criteria***

Patients with age >18 years, both male and female patients, closed fractures and fractures of mid shaft clavicle were included.

### ***Exclusion criteria***

Patients not consenting for the study, fractures of medial or lateral third of clavicle, pathological fractures, open fractures and fractures with associated neurovascular compromise were excluded from the study.

### ***Radiographs***

Anterior-posterior perpendicular to cassette and fractures were classified using AO classification.

### ***Procedure***

All the patients attending the emergency/out-patient department of the hospital which fit the inclusion criteria were included in the study. The patients were explained about the study objectives and due consent was taken. After obtaining due consent, the epidemiological data like age, sex, mode of trauma, handedness etc was recorded using a pre-determined printed proforma to make the data collection and subsequent analysis easier. The patient underwent an antero-posterior radiograph to better

delineate the fracture morphology and allow the classification of the fracture as per AO/OTA classification system. The data was then input into MS excel spreadsheet and the patients were allow to undergo further treatment as prehospital protocols.

## **RESULTS**

In our study 126 patients with midshaft clavicle fracture were included who qualified according to the inclusion criteria.

### ***Age distribution***

The average age in our study was 35 years.

### ***Sex distribution***

Out of the population studied, 65% were males while 35% were females suggesting a male preponderance of injury.

### ***Side affected***

Right side was the most commonly affected (70%).

### ***Mode of trauma***

Road traffic accident was the most common mode of injury (62%) followed by ground level falls (30%). The 8% of the patients sustained the injury due to assault.

### ***Fracture morphology***

Most common fracture morphology was AO/OTA type 15B1 (45%) followed by AO/OTA type 15B3 (30%) followed by AO/OTA type 15B2 (25%).

## **DISCUSSION**

Clavicle fractures have been considered as common fractures in young adults. Robinson et al and Nordqvist et al described a decreasing incidence of clavicle fractures until the age of 35 years, a more or less stable incidence until the age of 75 years and then again an increasing incidence with higher age.<sup>7</sup> Robinson et al in an epidemiological study reported that annual incidence in males was highest in under 20 age group with the incidence decreasing with each further cohort.<sup>8</sup> Pearson et al reported average age of patient sustaining clavicular fracture as 33 years.<sup>9</sup> Thus, clavicle fracture is an injury which is more common in middle aged population as compared to either of the extremes. When it comes to the gender distribution Postacchini et al reported a 68% male preponderance in the population studied by them.<sup>2</sup> The probable reason for this male preponderance can be based on the fact that more number of males are involved in road traffic accidents due to more number of vehicular traffic being male driven. In our study right side was found to be most commonly affected (70%). Perhaps handedness plays a role in higher incidence of fractures seen on the right side

due to the tendency of the falling patient to support himself with his dominant hand. Importance of side of injury lies in the future functional outcome requirements and the rehabilitation of patients. The most common mode of trauma in our study was road traffic accidents accounting for 62% of the fractures. Study by Postacchini et al reported road traffic accidents to be a cause for 47.5% fractures.<sup>2</sup>

In our study AO/OTA fracture type 15B1 (Simple diaphyseal fracture) was the most commonly reported fracture type-45%, followed by 15B3 (30%) and then type 15B2 was least common-25%. The epidemiological study by Postacchini et al reports AO/OTA type 15B2 to be the most common fracture type.<sup>2</sup> This variation can be due to varying modes of injury between the study groups.

### **Limitations**

A limitation of the current study is non-inclusion of the medial and distal third clavicle fractures. With the current high velocity injury mechanisms these fractures are also getting commoner by the day. Another limitation is non-inclusion of patients with multiple associated systemic injuries. High energy injuries like road traffic accidents usually have a concomitant systemic injury and multiple long bone fractures too.

### **CONCLUSION**

From our study we conclude that the middle-aged population is most commonly affected by the clavicle fractures with the fracture being more common in males and on the right side. Road traffic accident is the most common mode of injury. AO/OTA fracture type 15B1 is most common overall, while AO/OTA type 15B3 is most commonly associated with high energy injury mechanisms like road traffic accidents.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the institutional ethics committee*

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**Cite this article as:** Belapurkar K. Revisiting the epidemiology of mid shaft clavicle fracture-recent and emerging trends. *Int J Res Orthop* 2022;8:485-7.