



## FUNCTIONAL OUTCOME OF CONSERVATIVE MANAGEMENT OF CLAVICLE FRACTURE: A PROSPECTIVE STUDY

**Dr. Lal Bahadur Prasad**

Senior Resident, Academic, S.N.M.M.C.H., Dhanbad

**Dr. Bijoy Kumar\***

Associate professor Department of orthopaedics, RIMS, Ranchi. \*Corresponding Author

**ABSTRACT** **INTRODUCTION:** A weak site is seen in the mid-clavicular region of clavicle, which accounts for most fractures occurring in this region. A lot of muscular and ligamentous forces act on the clavicle, and a knowledge of these differing forces is necessary to understand the nature of displacement of clavicle fractures and to conclude why certain fracture patterns are problematic if not reduced and surgically stabilized

**AIM AND OBJECTIVE:** To determine the functional outcomes of clavicle fractures in non-surgically treated patients, Methodology: This is the Prospective Study conducted in Department of Orthopaedics and Out-Patient department, RIMS Ranchi, between September 2018 to february 2020 on All patients with displaced middle third fracture clavicle in the age group 18 to 60 years, The clinical outcomes of the non-surgically treated clavicle fractures were evaluated after 6 months of follow-up using the Constant scoring technique developed by Constant and Murley.

**RESULT:** These values indicate that there was no significant correlation between the clavicle fracture location and Constant score. In other words, the clavicle fracture location did not affect shoulder function. In addition, the low standardized residual (0.2 to 0.9) shows that the observed frequency and fracture location did not affect shoulder function. In addition, the low standardized residual (0.2 to 0.9) shows that the observed frequency and expected frequency were too small to allow us to reject the null hypothesis.

**CONCLUSION:** comminuted fracture, a fracture displacement of 21 mm or more, a shortening of 15 mm or more and fractures complicated by malunion and nonunion may lead to further shortening and can reduce shoulder function.

**KEYWORDS :** clavicle fracture, LCP, constant score, nail

### INTRODUCTION

Clavicle fracture account for approximately 2.6% of all fractures and for 44 % to 66% fractures about the shoulder. Middle third fractures account for 80% of all clavicle fractures whereas fractures of lateral and medial third of the clavicle account for 15% and 5 % respectively. Most minimally displaced clavicle fractures can be successfully treated non-operatively with some forms of immobilization.(1)

The clavicle is an S-shaped bone that acts as a strut between the sternum and the gleno-humeral joint. It also has a suspensory function to the shoulder girdle. The shoulder hangs from the clavicle by the coraco-clavicular ligament. The most commonly used system of classification of clavicular fractures is that of Allman. It is divided into 3 groups.(2)

**Group I:** Middle-third fractures.

**Group II:** Lateral-third fractures.

**Group III:** Medial- third fractures.

A weak site is seen in the mid-clavicular region of clavicle, which accounts for most fractures occurring in this region. A lot of muscular and ligamentous forces act on the clavicle, and a knowledge of these differing forces is necessary to understand the nature of displacement of clavicle fractures and to conclude why certain fracture patterns are problematic if not reduced and surgically stabilized(3). Mid-clavicular fracture is one of the common injuries of the skeleton, representing 3% to 5% of all fractures and 45% of shoulder injuries.

Several studies analyzed the safety and efficacy of primary open reduction and internal fixation for completely displaced mid-shaft clavicular fractures and have noted high union rate with a low complication rate. In a large number of complex clavicle fractures a satisfactory outcome is possible with a low complication rate using a locking compression plate.(4) Primary internal fixation of displaced comminuted mid-shaft clavicular fractures leads to predictable and early return to function. But treating fracture clavicle by surgical methods are not complication free, there can be scar hypertrophy, superficial and deep infection, non-union, delayed union, implant loosening and breakage, iatrogenic brachial plexus injury or great vessel damage. Majority of clavicle fractures are benign, but it can be associated lifethreatening intra-thoracic injuries based on the location of fracture. Fracture of the clavicle is associated with delayed union or nonunion, brachial plexus injury, compression or laceration of the great vessels, trachea, or esophagus, injuries to the neurovascular bundle and the pleura or apex of lung, poor cosmetic appearance, pneumothorax and intra-thoracic injury. There are various methods for

surgically treating clavicle mid-shaft fractures, such as intramedullary K-wires or Steinmann pins fixation and plate fixation. Plates when used for fixation can attain firm anatomical reduction in severe displaced or comminuted fracture. There are various plates including Sherman plates, dynamic compression plates, locking clavicle plates and semi tubular plates. Among all these, clavicle locking compression plate (LCP), which is precontoured to an S-shaped as per the curvature of the clavicle, are the most preferred. In the conservative stream, various braces are introduced to immobilize the mid third clavicle especially Parham support, Bohlers brace, Taylors support, Velpeau wrap, Billington yoke and commercial figure of eight brace.(5) Among the conservative braces, the commercial figure of eight brace is the most commonly used one. This study aims to obtain a deeper understanding of results and problems associated with both conservative and surgical procedure (ORIF with Clavicular LCP) in treating fracture mid-third clavicle and, to evaluate the functional outcome after each treatment.(6)

### AIMS AND OBJECTIVES

- To determine the functional outcomes of clavicle fractures in non-surgically treated patients
- To evaluate the clinical impacts of displacement, fracture patterns, fracture location, fracture comminution, shortening and fracture union on shoulder function

### METHODOLOGY

This is the Prospective Study conducted in Department of Orthopaedics and Out-Patient department, RIMS Ranchi, between September 2018 to february 2020 on All patients with displaced middle third fracture clavicle in the age group 18 to 60 years

### INCLUSION CRITERIA:

Adult male and female patients in the age group 18 to 60 years who presented to our hospital with displaced middle third clavicle fracture (Robinson type 2B1) and Those who give consent

### EXCLUSION CRITERIA:

- Open fractures
- Fracture in medial or lateral third of clavicle.
- Pathological fractures
- Undisplaced fractures
- Polytrauma patient
- Established non-union from a previous fracture
- Any medical contraindication to surgery or general anaesthesia (heart diseases, renal failure or active chemotherapy)

**Study Procedure:**

Particulars of patient like name, age, sex, MRD number, and address were noted. Then a detailed history was taken regarding mode of injury like, Road traffic accident, direct injury to shoulder, fall on outstretched hand and fall from height. Enquiry was made to note the location of pain and swelling over the affected clavicle. Past medical illness and family history were also recorded

**Local examination was done in the following steps:**

On inspection the following points were noted: Patients with fracture clavicle usually support the flexed elbow of the injured side with the other hand. Abnormal swelling was present in the middle third portion in case of middle third clavicle fracture. The condition of the skin over the clavicle was noted for any abrasion, laceration, any skin discoloration and contusion.

On palpation, the following points were noted.

Affected clavicle was palpated in full length and tenderness, abnormal mobility, crepitus and swelling at the middle third was looked for.

Movements: The affected side shoulder movements were restricted due to pain. The distal neurovascular status of the affected upper limb was examined and also the associated injuries along with fractured clavicle were noted. Plain radiograph of clavicle with shoulder in antero-posterior view was taken to assess the site of fracture and the fracture type (displacement and comminution). The fractures were classified according to Robinson's classification.

All clavicle fractures were treated non- surgically. All closed displaced fractures midshaft clavicle were treated conservatively or operatively according to consent given by each patients. For conservative management, clavicle brace and arm sling was used.

**Devices for measuring strength:**

- i. Strength was measured using a standard Salter pocket balance (Salter Co., UK) with a maximum weight of 25 kg.
- ii. Range of motion was measured using a goniometer.

The clinical outcomes of the non-surgically treated clavicle fractures were evaluated after 6 months of follow-up using the Constant scoring technique developed by Constant and Murley. Only the researchers performed the physical examinations and recorded the data and scores to minimize any inter-observer error. These data were analyzed using SPSS (version 15.0).

**Table 1: Range of movement.**

Forward flexion	Abduction
31-60 degrees	31-60 degrees
61-90 degrees	61-90 degrees
91-120 degrees	91-120 degrees
121-150 degrees	121-150 degrees
151-180 degrees	151-180 degrees
External rotation	Internal rotation
Hand behind head, elbow forward	Up to lateral thigh
Hand behind head, elbow back	Up to buttock
Hand to top of head, elbow forward	Up to lumbosacral junction
Hand to top of head, elbow back	Up to waist (L3 vertebra)
Full elevation	Up to T12 vertebra
	Up to interscapular region (T7)

- 1. Shoulder function treated non-surgically after clavicle fracture

The results showed that 34 patients (48.6%) had reduced shoulder function on the affected side, whereas 36 patients (51.4%) reported no reduction following clavicle fracture.

**Table 2 : Distribution of study subjects as per reduction**

REDUCTION	NO	%
PRESENT	34	48.6%
ABSENT	36	51.4%
TOTAL	70	100

**Table 3 : Distribution of study subjects as per outcome and union**

Outcome Results	Conservative methods of treatment	
	No.	%
Excellent/good	0	0.0
Satisfactory	29	41.42
Poor	41	58.58
<b>Total</b>	<b>70</b>	<b>100.0</b>
Union	23	32.85
Mal-union	28	40.0
Non-union	19	27.15
<b>Total</b>	<b>70</b>	<b>100.0</b>

**DISCUSSION**

Clavicle fractures represent 45% of all shoulder girdle injuries. Although clavicle fractures usually unite uneventfully with treatment, they can be associated with difficult early and late complications. Fractures in the middle third of the clavicle represent 80% of all clavicular fractures. Traditionally, clavicle fractures are treated conservatively, and surgical treatment has been associated with an increased complication rate. Indications for primary open fixation include significant displacement, fracture comminution and skin tenting that threatens the skin's integrity and fails to respond to closed reduction.

Based on the 70 patients in this study, our results showed that 34 patients (48.6%) had reduced shoulder function on the affected side, whereas 36 patients (51.4%) did not experience reduced shoulder function. The Constant shoulder score varied from 39 to 94, with a mean of 77.19.

Our results showed no statistically significant correlation between clavicle fracture location and the Constant score. The clavicle fracture location did not appear to affect shoulder function. The current recommendation for an unstable distal clavicle fracture is surgery; however, the number of distal clavicle fractures in our sample was small (7 patients). A larger sample may have altered the results. **Kruger-Franke et al.**(7) reported very good outcomes in a series of 41 patients with lateral clavicle fractures who were treated with the K-wire stabilization with cerclage and AO-plate osteosynthesis. An 8-year follow-up revealed good or very good outcomes in 97% of these subjects. Surgical treatment is recommended for unstable distal clavicular fractures, and several surgical methods have been proposed, including extraarticular or transarticular K-wire fixation, coracoclavicular screw fixation, tension band wiring and clavicular plate fixation. **Khashif Khan et al.**(8) also reported that shaft fractures occur most often in young adults, while medial and lateral end fractures are more common in older age groups.

Our results showed that patients with comminuted clavicle fractures had reduced shoulder function compared to patients with other types of fractures (oblique/spiral and transverse). This finding is consistent with an earlier report by **Wiesel et al.**(9) who used multivariate analysis to identify a lack of cortical apposition and the presence of comminution as risk factors for nonunion in diaphyseal clavicle fractures that lead to reduced shoulder function. 15

Clavicle fracture patients with shortening (in the AP view) of 14 mm had no reduction in shoulder function, but shortening of 15 mm or more was statistically associated with affected shoulder function. This finding agrees with earlier studies by **Goss and Constant et al.**(10) who reported that shortening of more than 15 mm was associated with shoulder discomfort and dysfunction. 16,18 Previous research has reported that shortening of more than 14 mm is associated with unsatisfactory results. We found a significant correlation between the fracture union and the Constant score. Patients with fracture malunions had reduced shoulder function compared to patients with fracture nonunions. In contrast, patients with good fracture unions had no reductions in their Constant scores. Malunions and nonunions lead to further shortening, which affects shoulder function. 18,20

**CONCLUSION**

Clavicle fracture treatment continues to progress. Based on our findings, we conclude that functional outcome is not very good of conservative management and even further complicated by malunion and nonunion, which may lead to further shortening and can reduce shoulder function.

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