

## Prognosis in Conservative Treated Fracture Clavicle

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### Abstract

**Introduction:** Traditionally most of clavicular fracture can be treated conservatively. Operative treatment is usually indicated for open injuries, lateral clavicular fracture, fragments pressing the pleural cavity, neurovascular compromise, overlying skin. The main aim of this study was to determine the shoulder functional outcomes after clavicle fractures in conservative treated patients.

**Method:** Retrospective study of 261 patients of conservative treated clavicular fracture selected. Patient were examined after 3 months and 6 months according to below given test protocol and constant score was calculated with reference constant. Pain measured as 0-15 within ordinary shoulder activities within 24 hours. Activities of daily living as 4 questions deal with everyday activities expect over last week (0--20 points). Four different active and pain free movement of the arm are performed (0-20).

**Result:** All the patient with fracture clavicle without associated other injuries were treated conservatively for 4-8 weeks, and then constant score of both affected and nonaffected side were calculated and compared of both sides after 3 and 6 months as described in materials and methods. Difference between normal and abnormal side graded as more than 30 poor; 21-30 fair; 11-20 Good, less than 11 excellent.

**Conclusion:** Conservative treated case of clavicular fracture is easy way to treat the cases in OPD bases but it lead to high rate of shortening and nonunion. In few case Operative should be done to restore the normal functional of shoulder integrity.

### Introduction

Clavicle fractures are among the most common skeletal injuries accounting for 2-5% of all adult fractures with an incidence of 29-64 cases per 100,000 [1, 2]. These injuries often result from moderate to high-energy mechanisms such as sports injuries, direct fall or road traffic accidents. The location of the fracture, type of fracture, along with degree of displacement and association of surrounding structures, is important to consider for treatment. Traditionally nonoperative treatment for clavicle fractures was considered the gold standard of care. Common conservative treatments are arm slings, strapping and figure-of-eight bandages.

The primary goal of treatment is to restore shoulder function to a normal level by setting preconditions which allow the clavicle to heal with minimal deformity, no loss of shoulder motion and minimized pain [3]. There is no controversy that undisplaced fractures and fractures with cortical alignment are successfully treated by conservative measures conservative treatment is also recommended for fractures with a displacement and shortening of less than 2cm [2, 4]. These facts may support a primarily nonoperative management of midshaft clavicle fractures in most cases. However, the challenge is

the identification of patients in whom to end conservative treatment, who might benefit from surgical fixation.

The main aim of this study was to determine the shoulder functional outcomes after clavicle fractures in conservative treated patients and to evaluate the clinical impacts of displacement, fracture patterns, fracture location, fracture comminution, shortening and fracture union on shoulder function. Malunion or shortening of the clavicle under nonoperative treatment may lead to a change of shoulder function. A shortening >10% affects scapular kinematics [5]. In a long-term period, there will be consequences such as acromioclavicular degeneration, rotator cuff dysfunction and furthermore reduction of force. Therefore, these type of patients who had reduced constant score will be ideal candidate for surgical treatment.

### Materials and Methods

A retrospective study of fractures of the Clavicle treated by conservative method was conducted in the Department of Orthopedics, Devdaha Medical College and Research Institute, Devdaha -9, Rupandehi, Nepal from 2016 to 2019. Patient was

informed, written consent was taken from all the patients who have fracture clavicle and no other associated injury were selected Total two hundred sixty one patients with clavicle fractures were selected who were treated conservatively. Patient were examined after 3 months and 6 months according to below given test protocol and constant score was calculated with reference constant CR [6].

**Pain**

Score the highest pain level you have experienced in your shoulder during ordinary activities within the last 24 hours. (0--15points)

**Activities of daily living**

The next 4 questions deal with everyday activities you expect over last week (0--20points).

1. Is your sleep disturbed by your shoulder? (0--2 points)
2. How much of your normal daily work does your shoulder allow you to perform? (0--4 points)
3. How much of your normal recreational activity does your shoulder allow you to perform? (0--4 points)
4. Objective part of the English Constant Score test protocol.

**Movement**

Four different active and pain free movement of the arm are performed i.e. if the arm can be lifted to 140 degree with pain and 110 degree without pain then 110 degree is recorded.

Forward and lateral elevations are recorded with a long – armed goniometer on both the sides. (0-20 points)

External rotation is performed without help and the hand should be placed behind and above head without touching the head. (0-10 points)

Internal rotation is performed without help and where the subjects use their thumbs to the point the anatomic landmarks specified to the right. (0-10 points)

Movements must be performed painlessly.

**Strength (0---25 points)**

The test is done with the test subject standing with their feet pointing directly forwards and a shoulder with a part.

The arm should be abducted 90 degrees in scapulas plane, if the

arm cannot be elevated to 90 degrees 0 point is given. The wrist is pronated so the palm faces down and the elbow is stretched as much as possible. The test subject is instructed to push maximally upwards for 5 seconds. The score is calculated from the highest score of 3 attempts, each performed with at least a 1 minute interval. The score corresponds to the force in pounds ( Max 25 Points )

**Results**

This study conducted on 261 patients, comprising 148 males (56.70%) and 113 females (43.30%). The age of patients ranged from 16 to 64 years, the average age being 36.4 years. All the patient with fracture clavicle without associated other injuries were treated conservatively for 4-8 weeks, and then constant score of both affected and nonaffected side were calculated and compared of both sides after 3 and 6 months as described in materials and methods. Difference between normal and abnormal side graded as more than 30 poor ,21-30 fair , 11-20 Good , less than 11 excellent [7]

**Shoulder Status**

In all the patients Constant score of both the shoulders were calculated and compared after 3 months of injury, 134 ( 51.34%) patients have difference of less than 5 meaning by shoulder function is almost normal and equal to unaffected side, in 77 (29.50%) have reduced function on affected side and in 50(19.15%) cases there is significant reduction in shoulder function, After 6 months 186 (71.26%) patients have difference of less than 5 meaning by shoulder function is almost normal and equal to unaffected side, in 37 (14,17%) have reduced function on affected sid and in 38(14.55%) cases there is significant reduction in shoulder function as described in the following table .

Duration	Constant score diff less than 5	Constant score diff of 5-15	Constant score diff more than 15
1 After 3 Months	134	77	50
2 After 6 Months	186	37	38

**Type of Fracture**

Depending upon type of fracture Constant score of both the shoulders were calculated and compared after 3 months and after 6 months of injury as described in the following table . It was found reduction in constant score is more in comminuated fractures 40 cases (47,05%) than in oqlique fractures and it is less effected in transverse fractures.

Fracture Type	Constant score diff less than 5		Constant score diff of 5-15		Constant score diff more than 15	
	3 month	6 months	3 month	6 months	3 month	6 months
Transverse (74)	56	62	12	9	6	3
Oblique (102)	46	64	42	10	17	12

## Displacement of Fracture

Depending upon displacement of fracture Constant score of both the shoulders were calculated and compared after 3 months and after 6 months of injury as described in the following table . It was found reduction in constant score is more( 54.92 %) in displaced fractures after 6 months than in less displaced fractures.

Displacement of fracture	Constant score diff less than 5		Constant score diff of 5-15		Constant score diff more than 15	
	3 month	6 months	3 month	6 months	3 month	6 months
Displacement below 20mm 190	168	153	40	20	19	14
Displacement above 20m 71	25	26	30	16	30	23

## Shortening After Fracture

Depending upon shorteing of fractured bone Constant score of both the shoulders were calculated and compared after 3 months and after 6 months of injury as described in the following table. It was found reduction in constant score is more (67.69 %) in more shortened fractures after six months than in less shortened fractures.

Shortening of fracture	Constant score diff less than 5		Constant score diff of 5-15		Constant score diff more than 15	
	3 month	6 months	3 month	6 months	3 month	6 months
Shortening below 14 mm 196	126	167	49	17	24	12
Shortening above 15 mm 65	6	21	27	19	32	25

## Fracture Union

Depending upon type of union of fractured bone Constant score of both the shoulders were calculated and compared after 3 months and after 6 months of injury as described in the following table. It was found reduction in constant score is more in more in malunited and nonunited fractures than in good union fractures.

Fracture union	Constant score diff less than 5		Constant score diff of 5-15		Constant score diff more than 15	
	3 month	6 months	3 month	6 months	3 month	6 months
Good Union 169	105	137	44	15	15	12
Malunion 88	28	52	31	31	31	23
Non union 4	0	0	1	2	3	2

## Fracture Site

Depending upon site of fractured bone Constant score of both the shoulders were calculated and compared after 3 months and after 6 months of injury as described in the following table. It was found reduction in constant score is more in more in sternum and acromion side bone fractures than in fractures.

Site of fracture	Constant score diff less than 5		Constant score diff of 5-15		Constant score diff more than 15	
	3 month	6 months	3 month	6 months	3 month	6 months
Sternal 12	5	6	3	1	4	3
Middle 202	103	141	61	32	38	29
Acromion 43	24	35	12	3	7	5

## Discussion

Clavicle fractures are generally treated conservatively because bone has excellent powers of repair that guarantee a good final consolidation of the lesion. Conservative treatment consists of the application of a figure-of-eight bandage (FEB) or a triangular bandage to restore the retro-positioning of the shoulder, resolving the superimposition of the stumps and limiting clavicular shortening. Surgery is usually reserved for the treatment of exposed lesions or highly displaced fractures to stabilise the bone malalignment with the use of screws, plates, endomedullary wires or bands [7].

According to the literature, the incidence of failure of conservative treatment of clavicle fractures ranges from 4.4% to 31% in terms of pain, loss of force, rapid fatigue, paresthesia, pain when lying

on the affected shoulder and aesthetic defects [8-10]. In our case series, these symptoms were observed in 71 patients, corresponding to 27.61 % of the cases studied.

Our findings revealed statistically significant correlation between the fracture type and shoulder function. 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. (2006), 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 [11].

Studies	Bone Shortening (Mean) (mm)	Displacement (Mean)(mm)
Our Study	15.2	20
Wiesel et.al.	21	-
Neer CS	20	14
Goss&Constant et.al.(1993)	-	15
Eskola et.al.	-	15
Postacchini et.al	-	23

Our fracture displacement results showed that a bone displacement of 20 mm or more can negatively impact shoulder function, but this effect was not statistically significant. However, a displacement of 21 mm or more was significant associated with reduced shoulder function. In another study, a fracture displacement of 20 mm or more was associated with unsatisfactory outcomes [12]. This is because an initial displacement of 20 mm or more is associated with a higher risk of nonunion and a poor clinical outcome [13, 14].

In agreement with literature reports, we found a correlation between the onset of shoulder dysfunction and a diaphyseal rather than a medial or lateral fracture site [15]. This may depend on the anatomical characteristics of the bone. The medial end is convex and the lateral end is concave, whereas the diaphysis, or midshaft, is tubular, thinner, has a lesser medullary component, is subject to more twisting forces and has a lesser repair capacity [16].

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. (1993), who reported that shortening of more than 15 mm was associated with shoulder discomfort and dysfunction [12, 17]. Previous research has reported that shortening of more than 14 mm is associated with unsatisfactory results [18]. A biomechanical assessment revealed that shortening of 15 mm or more is associated with reduced muscular strength during the extension, adduction and internal rotation of the humerus, with reduced peak abduction in the injured shoulder [19].

Neer suggests a statistical association between the degree of shortening of the bone segment and poor clinical results, with an increased risk of evolution to pseudoarthrosis; in our study, the mean reduction of the clavicular length in dissatisfied patients was 15.2 mm, but discordant data are reported in literature [20]. Eskola et al. identified 15 mm as the threshold value above which pain was likely to be present, whereas Hill et al. reported unsatisfactory results with a bone shortening of more than 20 mm but underlined that this situation is not certain to lead to pseudoarthrosis [15, 21]. Postacchini et al. determined the cut-off for surgical treatment as a bone length reduction of more than 2.3 cm This is supported by our finding of greater patient dissatisfaction with functional outcomes and reduced constant score in cases with bone segment shortening of more than 15mm [22].

We found a significant correlation between the fracture unity 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 [17-19].

In agreement with literature reports, we found a correlation between the onset of shoulder dysfunction and a diaphyseal rather than a medial or lateral fracture site [15]. This may depend on the anatomical characteristics of the bone. The medial end is convex and the lateral end is concave, whereas the diaphysis, or midshaft, is tubular, thinner, has a lesser medullary component, is subject to more twisting forces and has a lesser repair capacity [16].

There is still no consensus in literature as to whether conservative treatment of clavicle fractures is the optimal treatment in most cases or if surgical indications should be extended [23, 24]. Hillen et al. noted that there is still debate about which patients should be candidates for surgical bone synthesis but suggested that in cases involving severe dislocations, comminuted fractures, severe high energy trauma, involvement of the dominant limb, young subjects or sportsmen needing rapid, complete recovery and women and elderly patients, there is a high risk of failure after conservative treatment [25].

The results of the present study demonstrate poorer outcomes when the fracture occurs at the midshaft and when the shortening of the bone segment is more than 15 mm as compared to the original length. We also observed a greater degree of dissatisfaction in male patients.

However, our study has limitations. The study sample is relatively small, and there is no surgical control group. The Constant Score application at heterogeneous follow up points diminished its utility. This data could have served to calculate the post-treatment improvement and better quantified each patient's recovery.

## Conclusion

Conservative treated case of clavicular fracture is easy way to treat the cases in OPD bases but it lead to high rate of shortening and nonunion. In few case Operative should be done to restore the normal functional of shoulder integrity .

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