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## Evaluation of outcome of surgically treated displaced clavicle fractures

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### Abstract

Clavicle fracture is the most frequent trauma of the scapular girdle, and involves the midshaft in 4 out of 5 cases. Non-displaced clavicle fractures of whatever location are usually managed non-operatively. Rare open fractures or fractures associated with neurovascular complications are usually managed surgically. High-energy trauma (floating shoulder, shoulder impaction, multiple trauma) may be managed surgically, on a case-by-case basis <sup>[1, 2]</sup>. This was a prospective study where 50 patients attending Outpatient, casualty and patients admitted with clavicle fractures from January to December 2018 were studied. Totally 50 patients underwent open reduction and plate fixation from January to December 2018 were followed up for a period of 6 months from the date of admission and analyzed both clinically using Constant Murley scoring system and radiologically with serial radiographs. Clavicle fractures were more common on the right side; about 60% of the patients and 40% of patients had fracture on the left side. The majority of trauma was due to road traffic accidents which constituted to 80%, while fall constituted the rest 20%. Of the 50 clavicle fractures, 40 cases in this study are simple fractures and 6 cases are comminuted fracture and 4 cases was segmental clavicle fracture. All patients were followed up on a regular basis and serial X rays were taken. Union was defined as complete cortical bridging between the distal and proximal fragments. All fractures achieved union as determined by the surgeon after radiographic evaluation. The patients with simple displaced fractures united in 9 weeks while in cases of comminuted fracture with butterfly fragment required 13 weeks and segmental fracture required 15 weeks. There were no instances of nonunion.

**Keywords:** Clavicle fracture, displaced, precontoured clavicle locking plates

### Introduction

Clavicle fracture is the most frequent trauma of the scapular girdle, and involves the midshaft in 4 out of 5 cases. Non-displaced clavicle fractures of whatever location are usually managed non-operatively. Rare open fractures or fractures associated with neurovascular complications are usually managed surgically. High-energy trauma (floating shoulder, shoulder impaction, multiple trauma) may be managed surgically, on a case-by-case basis <sup>[1, 2]</sup>. Apart from these well-codified indications, several prospective comparative studies and meta-analyses recommended surgery for displaced midshaft fracture, to reduce risk of non-union and malunion, which can cause discomfort due to shortening of the global shoulder skeleton. In these studies, functional recovery was faster and pain was alleviated after surgery, but with a non-negligible rate of material-related complications, whatever the technique. There is thus a precise balance to be struck between indications for non-operative treatment and internal fixation in such displaced fractures in patients who are often young, with high functional and athletic demand, and who need to be well informed of the respective risk/benefit ratios <sup>[3]</sup>.

Extending surgical indications to displaced clavicle fracture, thanks to significant progress in fixation techniques, raises several issues regarding management both of midshaft and distal clavicle fracture: i.e., indications for and modalities of non-operative treatment; risks associated with internal fixation. Precise applied anatomy of the various types of fracture and their classifications is then mandatory <sup>[4]</sup>.

**Objective:** To evaluate patients with surgically treated clavicle fractures for the duration of union and complications of surgery.

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## Methodology

This was a prospective study where 50 patients attending Outpatient, casualty and patients admitted with clavicle fractures from January to December 2018 were studied.

## Inclusion criteria

Displaced middle or proximal 1/3<sup>rd</sup> clavicle fractures.  
All patients above 18 years age.

## Exclusion criteria

Patients with lateral 1/3<sup>rd</sup> fractures.  
Patients who were lost for follow up during the course of study.  
Patients below the age of 18 years.  
Undisplaced clavicle fractures.

## Results

Totally 50 patients underwent open reduction and plate fixation from January to December 2018 were followed up for a period of 6 months from the date of admission and analyzed both clinically using Constant Murley scoring system and radiologically with serial radiographs.

**Table 1:** Age and Sex wise distribution of cases

Age group	Male	Female	Total
18-40 years	17	09	26
41-60 years	13	08	21
60 years	02	01	03
Total	32	18	50

The majority of patients belonged to second to third decade of life which is the productive age group. Most of the patients enrolled in this study were males which constituted to 64% of the patients.

**Table 2:** Side Affected

Side	Number
Right	30
Left	20

Clavicle fractures were more common on the right side; about 60% of the patients and 40% of patients had fracture on the left side.

**Table 3:** Manner wise distribution of cases

Manner	Number
Road traffic accident	40
Fall from height	10

The majority of trauma was due to road traffic accidents which constituted to 80%, while fall constituted the rest 20%.

**Table 4:** Fracture Pattern

Pattern of fracture	Frequency	Percentage
Simple fracture	40	80
Comminuted fracture	6	12
Segmental fracture	4	8
Total	50	100

Of the 50 clavicle fractures, 40 cases in this study are simple fractures and 6 cases are comminuted fracture and 4 cases was segmental clavicle fracture.

**Table 5:** Time to Union

Fracture type	Time to union
Simple middle 1/3	9 weeks
Comminuted Middle 1/3	13 weeks
Segmental fracture	15 weeks
Medial 1/3	11 weeks

All patients were followed up on a regular basis and serial X rays were taken. Union was defined as complete cortical bridging between the distal and proximal fragments. All fractures achieved union as determined by the surgeon after radiographic evaluation. The patients with simple displaced fractures united in 9 weeks while in cases of comminuted fracture with butterfly fragment required 13 weeks and segmental fracture required 15 weeks. There were no instances of nonunion.

## Discussion:

Totally 50 patients underwent open reduction and plate fixation from January to December 2018 were followed up for a period of 6 months from the date of admission and analyzed both clinically using Constant Murley scoring system and radiologically with serial radiographs. Clavicle fractures were more common on the right side; about 60% of the patients and 40% of patients had fracture on the left side. The majority of trauma was due to road traffic accidents which constituted to 80%, while fall constituted the rest 20%. Of the 50 clavicle fractures, 40 cases in this study are simple fractures and 6 cases are comminuted fracture and 4 cases was segmental clavicle fracture. All patients were followed up on a regular basis and serial X rays were taken. Union was defined as complete cortical bridging between the distal and proximal fragments. All fractures achieved union as determined by the surgeon after radiographic evaluation. The patients with simple displaced fractures united in 9 weeks while in cases of comminuted fracture with butterfly fragment required 13 weeks and segmental fracture required 15 weeks. There were no instances of nonunion.

McKee RC *et al.* in a meta-analysis of six randomized controlled trials in 2012 involving 412 patients concluded that nonunion was higher in conservatively managed patients than in the operative group; they also concluded early return to work and lesser instances of symptomatic mal union as compared to the conservative group [5].

Robinson CM *et al.* in a multicentric randomized controlled trial in 2013 comparing conservative treatment for mid shaft clavicle fractures to open reduction and plate fixation concluded that open reduction and plate fixation reduces the rate of nonunion and has a better functional outcome with plate fixation. However, open reduction and plate fixation is associated with implant related complication and is more expensive.

Virtanen KJ *et al.* in a randomized controlled trial in 2012 in Helsinki university hospital comparing sling to plate osteosynthesis for treatment of mid shaft concluded that after a year non operative treatment had similar functional disability compared to operative treatment but with higher incidence of nonunion [6].

In a population based study in Ontario in 2014 by Leroux T *et al.* concluded that one in every four patients required re surgery, the most common indication being implant removal, re operation rate secondary to mal union, nonunion and infection were low but were higher than previously reported [7].

In a multicentre prospective clinical trial involving 132 patients in July 2015, Altamimi SA *et al.* concluded that fixation of a displaced clavicle fracture had better functional outcome with lower nonunion and mal union rates than conservative management at the one year follow up. The most common reason for re surgery in the operative group is implant removal, the study recommends primary plate fixation as a treatment of choice for active adults having displaced mid shaft clavicle fractures <sup>[8]</sup>.

### Conclusion

The current study uses primary open reduction and internal fixation with precontoured clavicle locking plate and screws for displaced fresh middle and medial third clavicle fractures. The advantage of this technique is that it offers rotationary control over the fracture fragments, need for unicortical purchase leading to less chance for intraoperative complications, rigid fixation and so early mobilization.

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