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## Evaluation of outcome of conservative versus operative management in clavicle fracture

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### Abstract

**Background:** Clavicle connects thorax to the shoulder girdle and plays an important role in movements at shoulder girdle. Clavicle fracture is a common traumatic injury around shoulder girdle. It can be treated both conservatively and surgically. The present study was undertaken to evaluate benefits and advantages of operative management versus conservative management in clavicle fractures.

**Methods:** 50 patients with clavicular fractures were included. Out of which 25 were treated conservatively and 25 were treated surgically between Oct 2018 to July 2020 in the Department of Orthopaedics, G K General hospital, Bhuj, Kachchh, Gujarat.

**Result:** Among 25 patients treated surgically with locking compression plate, 20 patients had fracture union in less than 11 weeks, 2 patients had implant failure (plate loosening) and 3 patients ended up with delayed union. Out of 25 conservatively treated patients, 14 patients had union between 13-16 weeks, 5 patients had union after 18 weeks and 6 patients had non-union. The functional outcome according to Constant and Murley score after fracture union in surgically treated clavicle fractures were excellent in 19 patients, good in 4 patients and fair in 2 patients.

**Conclusion:** In our study we found that in displaced or comminuted middle third clavicle fracture, internal fixation with plate and screws showed early union compared to conservative methods and also having advantages of early mobilization and good functional outcome.

**Keywords:** Clavicle, mid-shaft fracture, operative treatment, conservative treatment

### Introduction

Beauty bone/clavicle is the bony connection from thorax to shoulder girdle and plays an important role in movements at shoulder girdle. What makes clavicle more prone to get fractured is its subcutaneous position. It is caused by either low or high energy impact. Clavicular fractures account for approximately 5 - 10% of all fractures. Middle third clavicle fractures are around 70% - 80% while lateral third fractures are around 12% - 15% and medial third are around 5% to 8% [1].

It can be treated conservatively by figure of 8 brace or clavicle brace. Many modes of treatment of closed reduction have been described but reduction is not maintained in most cases and complications are expected [1]. Poor outcomes after conservative treatment of displaced clavicle fractures have been observed in certain publications [2, 3]. In non-union of middle third clavicle fracture, open reduction and internal fixation with bone grafting were performed with either intramedullary devices like steinmann pins, k-wires and rush rods or plate and screws fixation with semi tubular plate, dynamic compression plate and reconstruction plate [1]. In intramedullary devices rotational instability was noted and longer immobilization was required.

For lateral third clavicular fracture transacromial k-wire, cancellous screw and coracoclavicular screw can be used. Use of tension band wiring for lateral third clavicle fractures has been recommended by AO group [4]. The proponents of early fixation of clavicle fractures to prevent complications like malunion and non-union emphasize the value of adequate reduction and rigid fixation in providing early pain relief and promoting early functional recovery [5]. Thus the present study was undertaken to compare outcome of conservative and operative management in clavicle fracture.

### Material and Methods

The study was conducted between Oct 2018 to July 2020 in the Department of Orthopaedics, G K General Hospital, Gujarat Adani Institute of Medical Sciences, Bhuj, Kachchh, Gujarat.

### The present study was interventional study

A total of 50 cases satisfying inclusion and exclusion criteria were included in the study. Out of which, 25 patients were treated conservatively while 25 patients were treated surgically.

All 50 patients presenting with chest and shoulder injury were evaluated for clavicle fractures. After assessing patient's general condition, injured limb examination was carried out. Proper history was elicited from the patient. Co-morbid illness was elicited as a part of history taking.

On examination the swelling, deformity were checked on inspection and tenderness, abnormal mobility, crepitus were checked on palpation. Skin status evaluation was carried out and examination around the shoulder for associated other injuries/soft tissue injury was done. Then relevant X-rays were taken. Fracture patterns were classified based on the AO/OTA classification. The limb was then immobilized in arm-pouch till definitive mode of management was decided. For surgical group, all the routine laboratory investigations like CBC, RBS, Serum electrolyte, RFT, LFT, PT-INR and ECG, Chest X Rays were done.

### Inclusion Criteria

- All males and females between age group of 18 to 60 years coming to OPD and casualty.

- All the patients with fresh clavicle fracture.
- All the patients with open and closed clavicle fractures.

### Exclusion criteria

- Patients below 18years and above 60 years of age.
- Patients with co-morbid conditions preventing surgical intervention.
- Patients with local tissue condition making the surgery inadvisable.
- Patients presenting with delayed fracture.

All patients were then divided in to two groups, the operative group and the conservative group. For conservative management the methods used were – figure of 8 brace and broad arm sling. The limb was immobilized for six weeks. After six weeks range of motion exercises were started. For operative management, a transverse incision was made along the superior border of the clavicle under regional/general anesthesia. Fixation was performed following fracture reduction with minimal periosteal stripping. The plate was contoured to the shape of the clavicle and fixed with appropriate size screws. Postoperatively patients were given iv antibiotics for a period of 3 days and then discharged. The patients were given arm sling for two weeks. After two weeks suture removal was done and range of motion exercises were started. The patients were followed up at 1 month, 3 months, 6 months and 1 year. Cases were assessed clinically at subsequent follow-up visits and results were designated as Excellent, Good, Fair and Poor based on Constant and Murley scoring system.



Case 1: Plating



Immediate

3 months

1 year



Case 2: Conservative

Results

Table 1: Age distribution

Age (years)	No. of patients	Percentage
19-29	20	40
30-39	10	20
40-49	08	16
50-59	12	24
Total	50	100

Table 2: Sex distribution

Sex	No. of Patients	Percentage
Male	36	72
Female	14	28
Total	50	100

Table 3: Time of union

Time of union	Fractures treated surgically	%	Fractures treated conservatively	%	Chi square	P-value
11-14 weeks	20	80	11	44	6.88	0.031
14-20 weeks	03	12	08	32		
>20 weeks	02	08	06	24		

Table 4: Complications

Complications	No. of cases
Hypertrophic skin scar	04
Delayed union	03
Plate loosening	01
Plate breakage	00
Plate impingement	07

Table 5: functional outcome

Functional outcome	Fractures treated surgically	Fractures treated conservatively	Chi square	p-value
Excellent	19	14	2.49	<0.47
Good	04	06		
Fair	01	03		
Poor	01	02		
Total	25	25		

60% patients were less than 40years of age whereas about 16% patients were more than 40 years of age. Majority (90%) of the study patients were male.

On the basis of data statistical data calculation for the time of union, p-value was 0.0319 and chi square value was 6.8856 which is significantly proving better results with operative management. Whereas on the basis of functional outcome assessment on the basis of constant Murley scoring system chi-square value was 2.4909 and p-value was 0.4769 which shows better functional outcome results with operative treatment.

Discussion

The present study was conducted to study and compare benefits and outcomes of conservative versus operative management in clavicle fracture.

It was observed that there was wide difference in the age of the patients ranging between 18 years to 60 years. Middle third clavicle fractures were noted more in young individuals while older patients were having more lateral third clavicle fractures. Similar finding were reported by Bostman *et al.* [6] and Kao FC *et al.* [7].

In their study majority were males and majority of cases were having direct injury to the shoulder.

While studying the time of union, it was observed that in conservative group, union was observed between 11-14 weeks in 44% patients and 76% patients showed union in less than 20 weeks. Operatively managed group showed union in less than 14 weeks in 80% patients and 92% patient showed union in less than 20 weeks. Thus we can say that time of union was more in conservatively managed group as compared to operatively managed group.

According to Smekal *et al.* [8] union time was less in the operative group (12.1 weeks) as compared to the non-operative group (17.6 weeks). Similar results were reported by Judd *et al* [9], Witzel *et al* [10] and Smith *et al.* [11].

In the our study it was observed that rate of complication was higher in operative group of patients. But all the complications were minor. Hypertrophic scar was observed in 4 (16%) patients where as plate prominence was observed in 1 case. Delayed union was observed in 3 (12%) case due to plate loosening. In conservatively managed group malunion was observed in 26.67% patients and delayed union in 33.33% patients. Restriction of shoulder movements was observed in 1 patient.

Robbin C *et al.* [12] in a meta-analysis, studied six studies (n = 412 patients) and observed that non-union rate was higher in the conservatively treated patients (29 of 200) than in patients treated surgically (3 of 212) (p = 0.001). The rate of malunion was higher in the conservative group (17 of 200) than it was in the operative group (0 of 212) (p < 0.001).

Thus we can suggest that clavicle fractures can be safely treated conservatively as well as operatively but in some cases surgical treatment is required like displaced fractures causing impingement.

### Conclusion

From our study we concluded that the operative treatment provided good results in terms of lower rate of nonunion, malunion and an earlier functional return compared to conservative treatment but also has more complaint like hardware impingement.

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