



## Comparison of Conservative versus Operative Management in Clavicle Fracture

### KEYWORDS

Clavicle Fracture, Operative Management, Conservative Management, Functional outcome

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**ABSTRACT** Objective: To compare benefits and implication of conservative versus operative management in Clavicle Fracture.

*Method:* In the present study 30 patients were enrolled and divided into two groups. In one group 15 cases of clavicular fracture were managed conservatively whereas in the other group of 15 cases were treated surgically. Regular follow was done at every four weeks. Patients were looked up for any complication and duration required for union.

*Results:* In present study 30 patients were enrolled. Of them 24 (80%) had middle third clavicle fracture and six (20%) had lateral third clavicle fracture. In conservative group, union was observed between 13 to 16 weeks in 73.33% patients whereas in operative group union was seen in less than 12 weeks in 80% patients. In conservative group malunion was observed in 26.67% patients and delayed union in 33.33% patients. In operative group hypertrophic scar was observed in 20% patients and plate prominence in 13.33% cases. Delayed union was observed in one case due to plate loosening.

*Conclusion:* Operative treatment provided a significantly lower rate of nonunion and symptomatic malunion and earlier functional return.

### INTRODUCTION

Clavicle is the bony link from thorax to shoulder girdle and contributes to movements at shoulder girdle. Clavicle fracture is a common traumatic injury around shoulder girdle due to their subcutaneous position. Fracture of the clavicle roughly accounts 5 to 10% of all fractures and up to 44% of injuries to the shoulder girdle. About 70% to 80% of these fractures are in the middle third of the bone and less often in the lateral third (12% to 15%) and medial third (5% to 8%)<sup>1</sup>.

Fractures of the clavicle have been traditionally treated nonoperatively. Although many methods of closed reduction have been explained, it is accepted that reduction is nearly impossible to maintain and a certain amount of deformity and disability is likely to happen in adults<sup>1</sup>. Several publications have described about poor outcomes like malunion and nonunion (15%) after conservative treatment of severely displaced clavicular fractures.<sup>2,3</sup>

In established cases of non-union of middle third clavicle fracture open reduction and internal fixation with bone grafting were contemplated with A) Intramedullary devices like Steinmann pins, Kirschner wires, Knowles pin and Rush rods. In this method rotational instability was noted and immobilization for longer period was required. Complications like loosening and breakage of pins were common. B) Plate and screws fixation with semi tubular plate, dynamic compression plate and reconstruction plate were used to get rigid fixation<sup>1</sup>.

For lateral third clavicular fracture operative treatments include transacromial Kirschner wire, Cancellous compression screw and Coracoclavicular screw. AO/ASIF group has rec-

ommended the use of tension band wire construct for fixation of displaced lateral third clavicle fracture<sup>4</sup>.

The proponents of early fixation of fresh clavicular fractures to prevent complications like malunion and nonunion emphasize the value of accurate reduction and rigid fixation in affording quick pain relief and promoting early functional recovery<sup>5</sup>. Thus the present study was undertaken to compare the outcome of conservative and operative management in clavicle fracture.

**Material and Methods:** The present study was carried out on the patients with clavicle fracture, attending the outdoor and the emergency services. Thirty patients of clavicular fractures were involved in the study and divided into two groups. One group was treated conservatively and other was managed operatively. Each group contained 15 cases each.

Antero-posterior view x-rays of the affected and the normal side was done at the time of injury. Fractures were classified according to the AO Classification into Type A (extra-articular), Type B (partial articular) and Type C (complete articular).

The method of treatment of a fractured clavicle depends on several factors including the age, medical condition of the patient, the location of the fracture and associated injuries. It is important to achieve anteroposterior and lateral alignment of the fracture because the clavicle is a curvilinear bone.

Regular follow up was done at every 4 weeks. Local examination of the affected clavicle for tenderness, instability,

deformity and shoulder movements were assessed. X-rays were taken at each follow up to know about fracture union and implant position.

Rehabilitation of the affected extremity was done according to the stage of fracture union and duration from day of surgery. Patients were followed up till radiological union occurred.

**RESULTS:**

No.		Middle third clavicle fracture (n=24)		Lateral third clavicle fracture (n=6)	
		%	No.	%	No.
Age group	20-29	12	40.00	1	3.33
	30-39	6	20.00	0	0.00
	40-49	2	6.67	3	10.00
	50-59	4	13.33	2	6.67
Sex	Male	21	70.00	6	20.00
	Female	3	10.00	0	0.00
Side	Right	9	30.00	3	10.00
	Left	15	50.00	3	10.00
Mode of Injury	Fall on shoulder from two wheeler	8	26.67	4	13.33
	Road traffic accident	7	23.33	2	6.67
	Simple fall on shoulder	6	20.00	0	0.00
	Fall on outstretched hand (Indirect)	3	10.00	0	0.00
Total		24	80	6	20

**Table 1: Distribution of patients according to various characteristics**

In the present study total 30 patients were enrolled. Out of them 24 (80%) had middle third clavicle fracture and remaining 6 (20%) had lateral third clavicle fracture. 60% patients of middle third clavicle fracture were less than 40 years of age whereas about 16% patients of lateral third clavicle fracture were more than 40 years of age. Majority (90%) of the patients were males. Left sided fracture was common (50%) in middle third clavicle fractures patient.

In middle third clavicle fractures direct injury occurred in 70% patients, among them 8 patients (26.67%) were due to fall on shoulder from two wheeler, 7 patients (23.33%) were due to road traffic accident and 6 patients (20%) were due to fall on the shoulder after slipping. Indirect injury occurred in 3 patients (10%) due to fall on outstretched hand. In lateral third clavicle fracture, direct injury occurred in 6 patients (20%), among them 4 patients (13.33%) were due to fall on shoulder from two wheeler and 2 patients (6.67%) due to Road traffic accident.

**Table 2: Distribution of patients according to various treatment modalities**

Management technique		No.	%
Conservative		15	100%
Surgical	Reconstruction plate	11	68.75
	Semi tubular plate	3	18.75
	Dynamic compression plate	1	12.5

In the study two groups were formed. One group was conservatively managed and contains 50% cases. Whereas in surgically managed group reconstruction plate was used in 68.75% patients, semi tubular plate in 18.75% and dynamic compression plate in 12.5% cases.

**Table 3: Distribution according to duration of union**

Time of union	Conservative management	%	Operative management	%
8-12 week	01	6.67	12	80
13- 16 weeks	11	73.33	3	20
>16 weeks	3	20.00	0	0

It was observed that duration of union was more in conservatively managed group as compared to operatively managed group. In conservative group, union at fracture site was observed between 13 to 16 weeks in 73.33% patients whereas in operatively managed group 80% patients showed union in less than 12 weeks.

**Table 4: Distribution according to Complication**

Types	Conservative management	%	Operative management	%
Hypertrophic skin scar	-	-	3	20.00
Plate prominence	-	-	2	13.33
Plate loosening	-	-	1	6.67
Delayed union	5	33.33	1	6.67
Malunion	4	26.67	1	6.67
Restriction of shoulder movements	1	6.67	0	0

The overall rate of complications was higher in operative group but the complications were minor. 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 one patient. In operatively managed group hypertrophic scar was observed in 3 (20%) patients whereas plate prominence was observed in 2 cases. Delayed union was observed in one case due to plate loosening.

**Chart 1: Distribution according to duration of union**



It was observed that duration of union was more in conservatively managed group as compared to operatively managed group. In conservative group, union at fracture site was observed between 13 to 16 weeks in 73.33% patients whereas in operatively managed group 80% patients showed union in less than 12 weeks.

**DISCUSSION:**

The present study was done to compare the benefits and implications of conservative versus operative management in clavicle fractures.

It was observed that there was wide variation in the age of the patients. Ranging from 20 years to 60 years. Majority of the young patients were suffering from middle third fracture whereas lateral third fracture was observed in older patients. Similar finding were also reported by Bostman et al<sup>6</sup> and Kao FC et al<sup>7</sup>. Majority of the study patients were males. Bostman et al<sup>6</sup> and Kao FC et al<sup>7</sup> also had similar scenario in their studies. Direct injury was observed in majority of the patients in the study. In middle third clavicle fractures 26.67% were due to fall on shoulder from two wheeler, 23.33% were due to road traffic accident and 20% were due to fall on the shoulder after slipping. Indirect injury occurred in 3 patients (10%) due to fall on outstretched hand. In lateral third clavicle fracture the direct injury occurred in 13.33% which was due to fall on shoulder from two wheelers and in 6.67% due to road traffic accident. In a study by Bostman et al,<sup>6</sup> the mechanism of injury in 36.8% patients was due to fall from the two wheeler, slipping and fall in 23.30% patients, motor vehicle accident in 18.45% patients and sports injury 21.36% patients. This shows direct injury to the shoulder is the common cause of this fracture.

In this study 15 patients were managed conservatively whereas in 15 patients operative management was done. In surgically managed group reconstruction plate was used in 68.75% patients, semi tubular plate in 18.75% and dynamic compression plate in 12.5% cases. Similar pattern of operative technique was also reported by Bostman et al<sup>6</sup> and Lokesh Holagundi<sup>8</sup>.

While studying the duration required for union of fracture it was observed that in conservative group, union at fracture site was observed between 13 to 16 weeks in 73.33% patients. Operatively managed group showed union in less than 12 weeks in 80% patients. Thus we can state that duration of union was more in conservatively managed group as compared to operatively managed group.

Lazarus MD<sup>18</sup> stated radiological union occurred approximately between 6 to 12 weeks in surgically managed patients. According to Smekal et al<sup>9</sup> time to union was shorter in the operative group (12.1 weeks) as compared with the nonoperative group (17.6 weeks). Similar observations were also reported by Judd et al<sup>10</sup>, Witzel et al<sup>11</sup> and Smith et al<sup>12</sup>.

In the present study it was observed that rate of complication was higher in operatively managed patients with minor complications. Hypertrophic scar was observed in 3 (20%) patients whereas plate prominence was observed in 2 cases. Delayed union was observed in one 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 one patient. Smekal et al<sup>9</sup> observed delayed union (no evidence of healing at twenty-four weeks after injury) developed in six patients in the nonoperative group (six of thirty, 20%) versus one of the operative group (one of thirty, 3%) (p = 0.02).

Judd et al<sup>10</sup> observed high complication rate in the operative group (48%) compared with the nonoperative group (7%).

Witzel et al<sup>11</sup> observed 80% of the operatively treated patients resumed athletic activity, while only 55% of nonoperatively treated patients resumed athletic activity.

In a Meta analysis Robbin C et al<sup>13</sup> studied Six studies (n = 412 patients, mean Detsky score = 15.3). They observed that nonunion rate was higher in the nonoperatively treated patients (29 of 200) than it was in patients treated operatively (3 of 212) (p = 0.001).

The rate of symptomatic malunion was higher in the nonoperative group (17 of 200) than it was in the operative group (zero of 212) (p < 0.001).

Thus we could state that clavicle fractures are usually treated conservatively but there are specific indications for which operative treatment is needed like comminuted, displaced middle third clavicle fractures and displaced lateral third clavicle fracture.

**CONCLUSION:**

Operative treatment provided a significantly lower rate of nonunion and symptomatic malunion and an earlier functional return compared to that of the conservative treatment.

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