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# COMPARATIVE STUDY OF OUTCOME OF NON-OPERATIVE AND OPERATIVE MANAGEMENT OF DISPLACED FRACTURE CLAVICLE- A OBSERVATIONAL STUDY

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### Abstract

**Background and Aim:** The fracture of the clavicle has been treated conservatively for years as non-union of clavicle fracture is rare, shown as low as 0.12-08% with conservative treatment. Mal-union was considered to be of radiographic importance. This study aims to compare the patient's oriented outcome after non-operative with operative treatment for fracture clavicle.

**Material and Methods:** This is a prospective observational study conducted in the department of Orthopedics at tertiary care institute for the period one year. Total 60 patients of displaced fracture of clavicle (AO B1 & B2) were divided into two groups that is operative and non-operative. Operative patients were discharged after 3 days. The non-operative cases were discharged same day. The operated cases were called for suture removal after 10 days and movements were started gradually as per the pain permitted.

**Results:** Of all 60 patients the age varied between 18-70 years with mean age was 35.5 years. The non-operative groups 22 were males and 8 were females while in operative group 25 were male and 5 were females. Average time taken for union in non-operative cases was 16.5 weeks, whereas in operative group it was 10.40 weeks. Overall in non-operative patients 19 were satisfied, 6 were partially satisfied and 5 were not satisfied, in operative

group 25 were satisfied while 5 were unsatisfied.

**Conclusion:** Though operative treatment is better in terms of early mobilization, union, absence of mal-union, cosmetically well accepted, it has its own complication which should also be taken into consideration while choosing between the two modalities. Seeing at satisfaction level in patient related to functional outcome the conservative treatment plays a vital role in poor patients.

**Keywords:** clavicle, fracture, mal-union, satisfaction

## Introduction

Fracture of clavicle are common injuries with incidence of 2.6 % of all fracture<sup>1</sup> and 44% of the shoulder girdle fracture.<sup>2,3</sup> Commonest site of the clavicle fracture is middle shaft accounting to as much as 80% of clavicle fractures.<sup>1,4</sup> The Reason for mid shaft involvement is the transitional change of lateral curve of clavicle which is covered by muscles and medial relatively bare bone.<sup>4</sup> The fracture of the clavicle have been treated conservatively for years as non-union of clavicle fracture is rare, shown as low as 0.12-08% with conservative treatment. Mal-union was considered to be of radiographic importance. Recent study showed non-union of clavicle fracture was as high as 10-15% specially cases where initial shortening of the bone is more than 20 mm.<sup>5</sup> Hill et al in a study of 242 patient of which 66 (27%) were displaced clavicle fractures shows non-union in 15% cases. 25% had mild to moderate pain. 28 out of 52 patients available for follow-up had cosmetic complaint.<sup>5</sup> Functional and cosmetic outcome is related not only to union but also to the length of bone. Eskola et al reported that patient with shortening of more than 15 mm of bone had significant pain.<sup>2</sup> Clavicle act as strut to keep upper limb away from the trunk and transmit forces from upper limb to trunk, so displaced fracture of clavicle may result in non-union, mal-union with poor functional outcome and cosmetic deformity.<sup>7-9</sup> So the pendulum of the management is shifting towards operative management for clavicle fractures, but operative treatment has its own complication like cost of treatment, infection, complication of anaesthesia and injuries to nerve and vessel. Fortunately injury to major

nerve is very rare except injury to supraclavicular nerve which is a common complication with 10-29% incidence,<sup>7-9</sup> this leads to cutaneous hypoesthesia in the infraclavicular region shown to be as high as 55.3%.<sup>10</sup> So there is no uniform consensus o treatment of clavicle fracture. This study aims to compare the patient's oriented outcome after non-operative with operative treatment for fracture clavicle.

## Materials and Methods

This is a prospective observational study conducted in the department of Orthopedics at tertiary care institute for the period one year. Total 60 patients of displaced fracture of clavicle (AO B1 & B2) were divided into two groups that is operative and non-operative.

**Inclusion Criteria were:** Age should be above 17 years, losed mid shaft fracture, no medical complication of general anaesthesia (in operative case)

**Exclusion Criteria were:** Pathological fracture, Compound fracture, Fracture with neurovascular injury, Fracture with coracoclavicular ligament injury

The informed consent was taken. After the decision of the patient they were allotted to Group I (conservative) & Group II (operative).the study was carried out till 30 patients were included in each group. Conservative Group: 30 patients of this group were treated with traditional clavicular brace or figure of 8 bandage and arm sling in ipsilateral site. Operative Group: These patients were investigated and treated with s shaped locking clavicular plate. The surgery was performed within 4-5 days of injury. Under general anaesthesia the patient positioned supine with folded towel at inter-scapular region.

Painting draping was done under strict aseptic condition. Incision was planned transversely along clavicle at fracture site. Supraclavicular nerve was dissected and was preserved. After the soft tissue dissection the fracture site was exposed and reduced. Fixation was done with locking S shaped clavicular plate. At least 3 screws were fixed on each side of the fracture to fix the fragments inter-fragmentary lag screws were used whenever required. The wound was closed over a suction drain in layers. Arm pouch or arm sling was given postoperatively.

Operative patients were discharged after 3 days. The non-operative cases were discharged same day. The operated cases were called for suture removal after 10 days and movements were started gradually as per the pain permitted. Otherwise the follow-up of both group's patients were done at 6 weeks, 3 months, 6 months using patients subjective evaluation, DASH score, range of motion, radiological assessment and complication if any.

## Results

Of all 60 patients the age varied between 18-70 years with mean age was 35.5 years. The non-operative groups 22 were males and 8 were females while in operative group 25 were male and 5 were females. (Table 1) In the conservative group 21 and in operative group 24 had dominant side involvement all the fracture were AO type B1 or B2. Time take for the wound healing was 13. Average time taken for union in non-operative cases was 16.5 weeks, whereas in operative group it was 10.40 weeks. In non-operative group there were 2 cases of non-union, 13 mal-union, 4 had muscle wasting, 3 had pressure symptoms in upper limb, 2 had stiffness of shoulder, 6 patients complaint of pain

after union. Of 13 cases of mal-union only 6 patients complaint of cosmetic deformity but all were satisfied with union and functional outcome. In operated group all cases united and there was no mal-union. 2 patients developed infection and implant needed removal, 4 patient's complaint of hardware prominence and irritation. Total 3 patients needed implant removal, 5 patients' complaint of ugly surgical scar, 5 patients' complaint of postoperative infraclavicular hypoesthesia which recovered with time in most of the cases. Overall in non-operative patients 19 were satisfied, 6 were partially satisfied and 5 were not satisfied, in operative group 25 were satisfied while 5 were unsatisfied. (Table 2)

## Discussion

Considering the very low incidence of non-union and mal-union as of only radiographic importance the fracture clavicle was treated conservatively for decades. No studies has produced these result after that.<sup>11</sup> However recent studies showed that non-union incidence in the range of 10-15% and mal-union leads to poor cosmetic & functional outcome.<sup>12</sup> Hence the trend has shifted towards operative treatment.<sup>6,7</sup> Now the clavicular plate is widely used to fix the displaced clavicle fracture. The average time taken to union in conservative group was 16.5 weeks whereas in operative group it was 10.4 weeks. In conservative group there were 2 cases of non-union and 13 cases showed mal-union but in operative group there was no case of non-union or mal-union. 5 cases from operative group complaint of postoperative infraclavicular hypoesthesia and 5 cases operated patient has complaint of ugly surgical scar. The other

complication in conservative group is wasting of muscle, pressure symptoms due to clavicular brace or figure of 8 bandage, stiffness of the shoulder which recovered with physiotherapy. Overall in conservative group 19 cases were satisfied 6 cases were partially satisfied and 5 cases were not satisfied, while in operative group 25 cases were satisfied and 5 cases were not satisfied. The main factor involved for opting non-operative treatment was cost factor.

## Conclusion

Though operative treatment is better in terms of early mobilization, union, absence of mal-union, cosmetically well accepted, it has its own complication which should also be taken into consideration while choosing between the two modalities. Seeing at satisfaction level in patient related to functional outcome the conservative treatment plays a vital role in poor patients.

**Table 1: Demographic information of study participants**

Gender	Operative group (%)	Non-operative group (%)
Male	25 (83.3)	22 (73.3)
Female	5 (16.6)	8 (13.3)
Total	30 (100)	30 (100)

**Table 2: satisfaction level of patients in operative and non-operative group**

Group	Satisfied	Partially Satisfied	Not Satisfied
Operative group	25	0	5
Non-operative group	19	6	5

## References

1. Neer CS. Fractures of the Clavicle. In: Rockwood CA, Green DP, eds. Fractures in Adults. 2nd ed. Philadelphia, PA: JB Lippincott; 1984:707–713.
2. Eskola A, Vainionpää S, Myllynen P, Päätiälä H, Rokkanen P. Outcome of clavicular fracture in 89 patients. Arch Orthop Trauma Surg. 1986;105(6):337-8.
3. Craig EV. Fractures of the clavicle. In: Rockwood CA, Matsen FA, eds. The Shoulder. Philadelphia, PA: WB Saunders; 1990:367–412. J Bone Joint Surg Am. 1967 Jun;49(4):774-84.
4. Allman FL Jr. Fractures and ligamentous injuries of the clavicle and its articulation. J Bone Joint Surg Am. 1967 Jun;49(4):774-84.
5. Hill JM, McGuire MH, Crosby LA. Closed treatment of displaced middle-third fractures of the clavicle gives poor results. J Bone Joint Surg Br. 1997;79(4):537– 539.69.
6. Rasmussen JV1, Jensen SL, Petersen JB, Falstie-Jensen T, Lausten G, Olsen BS. A retrospective study of the association between shortening of the clavicle after fracture and the clinical outcome in 136 patients. Injury. 2011 Apr;42(4):414-7. doi: 10.1016/j.injury.2010.11.061. Epub 2011 Jan 15.
7. Canadian Orthopaedic Trauma Society. Non-operative treatment compared with plate fixation of displaced midshaft fractures. A multicenter, randomized clinical trial. J Bone Joint Surg Am. 2007;89(1):1–10.
8. McKee, Michael d. Md, Frcs(c); Pedersen, Elizabeth m. Md; Jones, Caroline Bsc, Pt; Stephen, David j.g. Md, Frcs(c); Kreder, Hans j.

- Md, Frcs(c); Schemitsch, Emil h. Md, Frcs(c); Wild, Lisa m. Bscn; Potter, Jeffrey Bsc. Deficits Following Non-operative Treatment Of Displaced Midshaft Clavicular Fractures. JBJS: January 2006 - Volume 88 - Issue 1-p 35–40.
9. Shen WJ, Liu TJ, Shen YS. Plate fixation of fresh displaced midshaft clavicle fractures. Injury. 1999;30(7):497–500 Indian J Orthop. 2014 Jan;48(1):10-3. doi: 10.4103/0019-5413.125478.
  10. Wang L1, Ang M1, Lee KT1, Naidu G1, Kwek E1. Cutaneous hypoesthesia following plate fixation in clavicle fractures. Indian J Orthop. 2014 Jan;48(1):10-3. doi: 10.4103/0019-5413.125478.
  11. Rowe CR. An atlas of anatomy and treatment of midclavicular fractures. Clin Orthop Relat Res. 1968 May-Jun;58:29-42.
  12. Eskola A, Vainionpaa S, Myllynen P, et al. Surgery for ununited clavicular fracture. Acta Orthop Scand. 1986;57(4):366–367.