

# Conservative Versus Operative Treatment of Displaced Midshaft Clavicle Fracture-A Randomized Controlled Study

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## Abstract

Clavicle fractures were considered non-troubling entity in the past. Majority of mid-shaft fractures used to be treated conservatively and many studies reported relatively good results. However, more recent studies have reported poor results following conservative treatment regarding non-union, disabilities and cosmetic reasons. The results of operative treatment improved considerably with the introduction of better implants and awareness regarding disability. The aim of this study was to compare the results of closed versus operative treatment. Methods: Total of 80 patients with displaced midshaft clavicle fractures in two groups of 40 each in conservative and operative groups were compared. Mean age was 30 years range from 18 years to 60 years. All patients in the conservative group were treated using a figure of eight bandages with an arm sling, and in the operative group, curved locking plate was used. All patients were evaluated clinically and radiologically at three weeks, six weeks and after three months of treatment respectively. All patients were followed up for 3 months following the treatment. The outcome was rated using DASH score and Constant Moor scores. *Results:* The mean fracture union time was significantly lower in the operative group (14.4 weeks) as compared to the conservative group (24.2 weeks). The difference is statistically significant ( $p < 0.05$ ). DASH score and Constant Moore score were significantly better in the operative group. They were 94.2 and 96.4 in operative and 78.2 and 84.4 in conservative group respectively. *Conclusion:* Within the limitations of the present study it can be concluded that by the operative treatment, fractures of clavicle have improved outcomes in terms of short union time, anatomical restoration of shape and length, early mobilization and fast rehabilitation as compared to conservative treatment in our follow up. Primary fixation of fracture clavicle is of immense importance while treating young, active and persons involved in sports.

**Keywords:** Fracture clavicle, Outcome, Sportsperson, Conservative v/s operative management.

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## INTRODUCTION

The clavicle or collar bone and it is the first bone to ossify in the body, Anatomically it is placed horizontally, protects brachial plexus and provides structural stability to shoulder girdle. Fractures of the clavicle are the common type of injuries in adults accounting for 2.6 to 4% of all adult fractures and 35% of the shoulder injuries [1]. Midshaft of the clavicle is the thinnest part of the bone and it is common area to get fractured and up to 82% of all the clavicular fractures belong to this area and up to 17% of fractures are in the lateral one-third and 2% are in the medial one third [2, 3]. The incidence of clavicular fractures in males is usually highest in the second and third decades and tends to decrease afterward [4]. In females, it is bimodal with peak incidences in young and elderly [2]. The conservative treatment of mid-shaft fractures of clavicle have resulted in unsatisfactory outcomes in approximately 30% of patients, the conservative

treatments have resulted in mal-union, poor cosmetic outcomes and loss of upper limb strength and moderate pain [2, 5, 6]. Hence, in many cases, surgical treatment has become standard of the case especially for displaced fractures and they have often shown better outcomes in follow-up to one year [7]. However, controversy still exists as to which line of treatment is suitable for patients because surgeries are also associated with complications like infections, non-union and other complications. With this background, we in the present study tried to evaluate the results of closed versus operative treatment in mid-shaft clavicle fractures by evaluating the patients clinically and radiologically at three weeks, six weeks and after three months of treatment respectively.

## MATERIALS AND METHODS

This two-year randomized controlled study was conducted in the Department of Orthopaedics of

Prathima Institute of Medical Sciences, Nagunur, Karimnagar from January 2017 to October 2018. Institutional Ethical committee permission was obtained for the study. Written consent was obtained from all the patients after explaining the nature of the study in their local language. Those willing to participate in the study and those available for post-operative follow up were included in the study. In our study, a total of n=80 patients were included in the study. They were divided into two groups of n=40 each, in conservative group n=40 patients were treated with the figure of eight bandages and arm sling, movements were restricted for six weeks till clinical-radiological union and then followed by gradual mobilization. Among operative group n=40 patients, 'S' shaped locking plate was used. All surgeries were performed under general anesthesia. The surgical incision was curvilinear and locking plate was placed on the superior surface of the clavicle. The postoperative patient was mobilized in arm sling with no restriction of movements. In conservative group figure of eight bandages was applied and taught to patients and attendants in OPD. Check X-rays were taken immediately post op and post sling placement, at three weeks six weeks and three months.

## RESULTS

In the present study, there were n=32 male patients and n=8 female patients that were included in the operative was the male to female ratio was 4:1. The

conservative group n=40 out of which n=34 male and n=16 females, and the male to female ratio was 2:1 respectively. Out of n=80 patients, n=24 patients in the operative group and n=20 patients in the conservative group were aged between 18 - 30 years. The right side was involved in n=64 patients and n=26 patients were left side in the clavicle fractures. The mode of injury was by falls in n=56 (70%) were due to RTA and n=24 (30%) were because of falls. Associated injuries in the operative group were n= 28 (35%) as compared to n=12 (15%) in the Conservative group. There was the union in all the cases (100%) treated by the operative method and in the conservative group n=2 cases (2.5%) were having non-union both the patients were of >55 years and had refused operative treatment. There were no cases of implant loosening, plate breakage, infection and wound-related complications in any of the patients. The mean duration of healing time was shorter in operative group ( $14.4 \pm 0.60$  weeks) and the mean duration of healing in the conservative group was  $22.60 \pm 0.70$  in the operative group the duration was slightly greater in the conservative group as compared to the operative group. The Disabilities of the Arm, Shoulder, and Hand (DASH) Score were recorded and calculated in the patients [9]. The mean scores preoperatively in the operative group were 40 and postoperatively after 3 months it was found to be 15 and the mean scores in the conservative group pre-operatively were 36 and post-treatment after 3 months it was found to be 21.

**Table-1: Showing the sex wise and group-wise patients involved in the study**

	Operative group	Conservative group	Total
Male	32	34	40
Female	8	16	40
Total	40	40	80

Constant–Murley shoulder scoring system [10] 96.8% and 91.62 respectively there was no statistically significant difference between two groups with respect to flexion, extension, abduction, internal rotation and external rotation movements with the p-value of 0.532,

1.00, 0.322, 0.052 and 0.056 respectively. Patients in the operative group had a better range of shoulder abduction movement than conservative group ( $p=0.015$ ).



**A: Pre-operative, B: Intra-operative and C: final radiograph of a 34 years old patient.**

## DISCUSSION

A total of 80 cases were selected for the study based on the inclusion and exclusion criteria. Of these n=40 were managed by conservative methods and n=40 were managed by operative methods. The operative patients were operated with 'S' shaped locking plate. Open reduction together with internal plate fixation and intramedullary fixation are the methods utilized during the surgical techniques for the treatment of displaced midshaft clavicle fractures. Plating is considered as the standard fixation technique for the treatment of clavicular fractures. In this study, we used this technique for the treatment. It is based on the principle of fracture fixation by direct reduction and adding pressure on the fracture to provide biomechanical stability, allowing patients to become active earlier postoperatively [11]. The advocates of conservative treatment have found the high rate of good outcome with low rates of complications and no functional benefits by the operative method in terms of functional outcomes [12]. Nevertheless, many authors have suggested operative treatment for fracture clavicle particularly in cases of high displacement, skin penetration, communication which otherwise carries high complication rate despite the fact that the risk of rare complications described in the literature [13-15]. Many possible complications are associated with operative treatment including subclavian vessel injury, brachial plexus injury requiring immediate repair [15-17]. The functional consequences of clavicle shortening are controversial. Hill *et al.*, [18] have reported shoulder dysfunction with shortening of 20 mm or more. However, Nordqvist *et al.*, [2] have reported no clinical significance of shortening on the function of shoulder and patient accepts angulations as well as residual bone prominence. The clavicle has several important functions facilitating shoulder placement more laterally and improving hand functions. Cadaveric assessments revealed abnormal biomechanical stress across shoulder girdle, including the acromioclavicular, glenohumeral and scapula-thoracic joints [19-21]. These studies provide a mechanical rationale for the idea that anatomical reduction may mitigate the long-term disability. Study of mid-shaft shortening correction demonstrated a high rate of patient satisfaction after operative treatment [22]. Displaced fractures with shortening more than 15 mm should be treated operatively for better results. A meta-analysis of recent studies shown a reduced risk of non-unions by 86% inoperative as compared to the conservative group [23]. Primary fixation of the clavicle is an easy procedure and of more benefit to the patient as well surgeon in terms of fast recovery and fast rehabilitation than established mal-union and non-unions [23]. Stable fixation is a safe and effective treatment with minimal complications than treating non-unions. According to the Jadad model, the Cochrane review by Lenza *et al.*, [24] was selected in systemic review and found that surgical intervention was superior to conservative treatment in the DASH questionnaire, Constant Moor

scoring, symptomatic mal-unions, overall treatment failure, deformity or asymmetry, stiffness/restricted range of shoulder movements, number of patients return to sports activities and time to return back to previous activities. The conclusion is consistent with the finding by Robinson *et al.*, [4] that primary fixation for displaced mid clavicle fracture and found that open reduction and plate fixation has a lower rate of non-union and better functional outcome.

## CONCLUSION

Within the limitations of the present study, it can be concluded that by the operative treatment, fractures of clavicle has improved outcomes in terms of short union time, anatomical restoration of shape and length, early mobilization and fast rehabilitation as compared to conservative treatment in our follow up. Primary fixation of fracture clavicle is of immense importance while treating young, active and persons involved in sports.

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