

Original article:

Comparison of Treatment Methods for Displaced Midclavicular Fractures: A Prospective Study

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ABSTRACT

Background: Mid shaft fractures of clavicle are traditionally treated conservatively with closed reduction and immobilization methods. However, today there is increased prevalence of non-union or mal-union in cases of dislocated midshaft clavicular fractures after undergoing conservative treatment which has resulted in evolution of newer fixation methods. The present study was conducted with the aim to compare the union rate and functional outcome of displaced clavicular fracture using open reduction and closed reduction methods.

Materials and Methods: The present prospective study was conducted in the Department of Orthopaedics, Career Institute of Medical Sciences & Hospital, Ghaila, Lucknow, Uttar Pradesh (India). The study was conducted for duration of one year. In this study patients reporting to the inpatient department with mid shaft fracture of clavicle were included in the study. The functional outcome was assessed using shoulder score that ranged from 0-100 with 90-100 meaning excellent and 0-70 meaning poor. All the data was arranged in a tabulated form and analysed using SPSS software. Data was expressed as percentage of total.

Results: This prospective study enrolled 30 subjects; there were 19 males and 11 females. The mean age group of the study population was 32.07 +/- 3.2 years. Out of the 30, 15 underwent open reduction and 15 underwent closed reduction. The healing period was 12-24 weeks for 86.6 % of patients with open reduction and 60% patients with closed reduction. Cosmetic deformity was seen in 20% of the subjects of closed reduction. There was plate prominence in 3 patients who underwent open reduction.

Conclusion: In our study, functional outcome was excellent in 80% cases of Group I and 46.6% cases of Group II. It was fair in 2 patients of Group I and 5 patients of Group II. Functional outcome was poor in only 1 patient who underwent closed reduction.

Keywords: Clavicular, Functional, Fracture, Shaft.

INTRODUCTION

Clavicle forms the bony link between thorax and the shoulder girdle; it provides movement at shoulder girdle. Coracoclavicular ligament aids in hanging the clavicle to the shoulder.¹Clavicular fractures are one of the most common bony injuries. Fractures of the clavicle account for nearly 5% to 10% of all fracture and they contribute to up to 44% of shoulder girdle injuries. Mid-shaft area is

the most prone to fracture, accounting for around 80% to 85% of injuries. This is because it is the site where the typical compressive forces applied to the shoulder and the bone here has narrow cross section resulting in bony failure. Distal third accounts for 20% of fractures and medial third fracture contribute to 5% of fractures.²⁻⁴Mid shaft fractures of clavicle are traditionally treated conservatively with closed

reduction and immobilization methods like figure of eight splint.

Previous studies have demonstrated studies clavicle fracture, even if it is significantly displaced, is an essentially benign injury and had good prognosis when treated conservatively.^{5,6} However, today there is increased prevalence of non-union or mal-union in cases of dislocated midshaft clavicular fractures after undergoing conservative treatment which has resulted in evolution of newer fixation methods.

Surgery is now the accepted treatment for displaced clavicular fracture. According to a study there is about 15% rate of nonunion rate in widely displaced fractures of the clavicle treated without surgery and amongst all fractures there is initial shortening of more than 2cm.⁷ The present study was conducted with the aim to compare the union rate and functional outcome of displaced clavicular fracture using open reduction and closed reduction methods.

MATERIALS AND METHODS

The present prospective study was conducted in the Department of Orthopaedics, Career Institute of Medical Sciences & Hospital, Ghaila, Lucknow, Uttar Pradesh (India). The study was conducted for duration of one year. In this study patients reporting to the inpatient department with mid shaft fracture of clavicle were included in the study. Patients who were above the age of 18 years presenting with Robinson Classification Type 2B1 and 2B2 were included in the study. Procedure for open reduction- surgery was done under general anaesthesia. With patient supine, 7-9 cm incision was given in the mid of the clavicle. Dissection was performed and skin and subcutaneous tissue were divided followed by incision over the periosteum. Fracture was reduced and precountoured locking plates were fixed to medial and lateral aspect of clavicle using 3.5mm screws. This was followed by

closure of incision layer by layer. Sutures were removed after 10-12 days and it was followed by pendulum movements of the shoulder after pain relief.

Procedure for Closed Reduction: Figure of eight bandage was used and the limb was supported using a triangular sling under the elbow and forearm. This condition was maintained for 6 weeks which was followed by pendulum movements at the shoulder girdle. Patients were informed about the cosmetic deformity but the functional would be unrestricted.

The functional outcome was assessed using shoulder score that ranged from 0-100 with 90-100 meaning excellent and 0-70 meaning poor. All the data was arranged in a tabulated form and analysed using SPSS software.

RESULTS

This prospective study enrolled 30 subjects, there were 19 males and 11 females. The mean age group of the study population was 32.07 +/- 3.2 years. Out of the 30, 15 underwent open reduction and 15 underwent closed reduction Table 1 illustrates the mean duration taken for healing in both the groups. The healing period was 12-24 weeks for 86.6 % of patients with open reduction and 60% patients with closed reduction. Improper healing was observed in 2 patients after closed reduction even after 32 weeks. 24-32 weeks were taken for healing by 2 patients who underwent open reduction and by 4 patients of closed reduction. Table 2 shows the complications encountered during the study. They were both major and minor complications. Hypertrophic scar was seen in 2 patients of open reduction. Cosmetic deformity was seen in 20% of the subjects of closed reduction. There was plate prominence in 3 patients who underwent open reduction. There was a major difference in cases of delayed union. 6 patients of closed reduction and 1 patient of open reduction had delayed union. There

was only 1 patient in closed reduction group who had non union. Symptomatic malunion was seen in 20% patients of closed reduction.

Table 3 shows the functional outcome after treatment. Functional outcome was excellent in 80% cases of Group I and 46.6% cases of Group II. It was fair in 2 patients of Group I and 5 patients of Group II. Functional outcome was poor in only 1 patient who underwent closed reduction.

DISCUSSION

Fractures of the clavicle are generally managed conservatively. Various studies have been done to analyze the results of conservative treatment. In studies by Hill et al⁸ in 1997, Nordqvist et al⁹ in 1998 and Robinson et al¹⁰, they all concluded with poor results after conservative treatment of displaced clavicle fracture. Therefore displacement, with or without comminution in middle third clavicle fracture (Robinson Type 2B1 and 2B2), seem to be a specific contraindication for closed reduction. In our present study, Functional outcome was excellent in 80% cases of Group I and 46.6% cases of Group II. It was fair in 2 patients of Group I and 5 patients of Group II. Functional outcome was poor in only 1 patient who underwent closed reduction. In a study by Constant and Murley¹¹ the functional outcome was found to be significantly higher in patients treated by open reduction and internal fixation.

In the present study, the healing period was 12-24 weeks for 86.6 % of patients with open reduction and 60% patients with closed reduction. Improper healing was observed in 2 patients after closed reduction even after 32 weeks. 24-32 weeks were taken for healing by 2 patients who underwent open reduction and by 4 patients of closed reduction. According to Canadian analysis¹² the mean time

taken for fracture union was 16.4 weeks in ORIF group and 28.4 weeks in the conservative group. In case of displaced fractures longer duration of time is required for the callus to bridge the gap between the bone ends. In our present study, hypertrophic scar was seen in 2 patients of open reduction. Cosmetic deformity was seen in 20% of the subjects of closed reduction. There was plate prominence in 3 patients who underwent open reduction. There was a major difference in cases of delayed union. 6 patients of closed reduction and 1 patient of open reduction had delayed union. There was only 1 patient in closed reduction group who had non union. Symptomatic malunion was seen in 20% patients of closed reduction. According to a randomised trial by Canadian Orthopaedics Trauma Society¹³ non-union was reported in 3.2% cases amongst the operative group and in 14.3% among the nonoperative group.

Open reduction and rigid internal fixation offers various advantages like early return to work, less postoperative discomfort and lesser incidence of complications. With advancement in technology there is availability of a variety of plates and screws that offer a limited chance of breakage. Few limitations of our study was smaller sample size

CONCLUSION

Though clavicle fractures can be managed conservatively but there is a greater incidence of complications while managing a case of displaced fracture conservatively. In these cases open reduction should be done. In our study, functional outcome was excellent in 80% cases of Group I and 46.6% cases of Group II. It was fair in 2 patients of Group I and 5 patients of Group II. Functional outcome was poor in only 1 patient who underwent closed reduction.

Table 1: Time Period of Union

TIME DURATION	OPEN REDUCTION (n/%)	CLOSED REDUCTION (n/%)
12-24 weeks	13/86.6	9/60
24-32 weeks	2/13.3	4/26.7
>32 weeks	0/0	2/13.3
Total	15/100	15/100

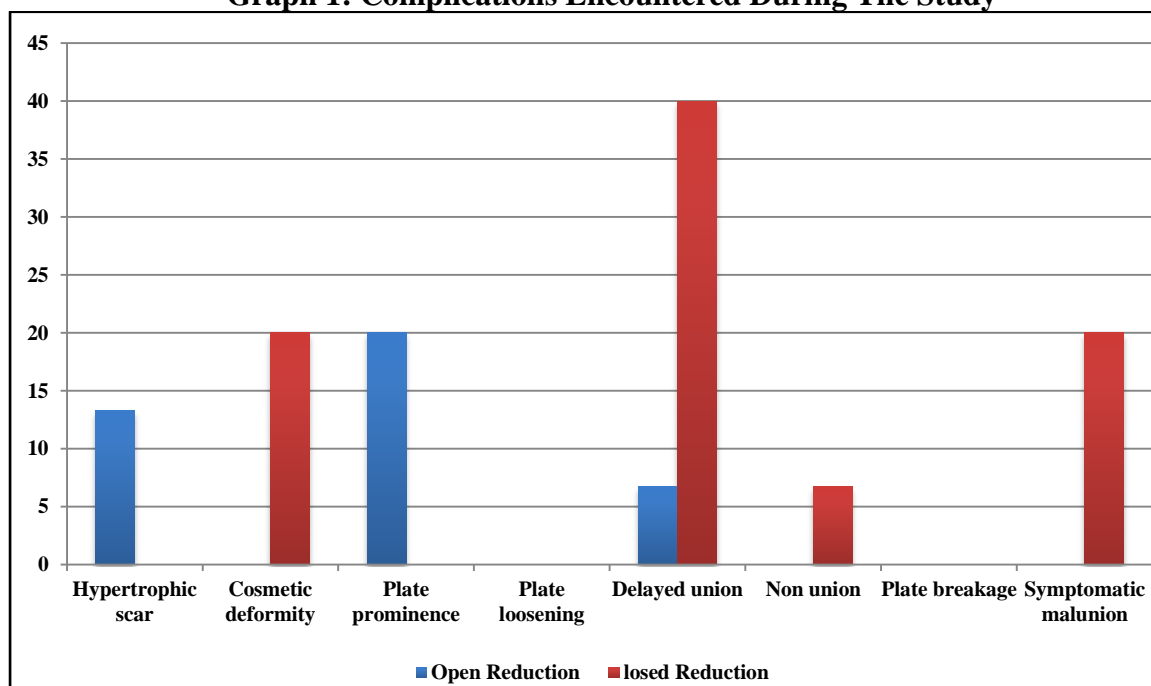
Table 2: Complications Encountered During The Study

COMPLICATIONS	OPEN REDUCTION (n/%)	CLOSED REDUCTION (n/%)
Hypertrophic scar	2/13.3	0/0
Cosmetic deformity	0/0	3/20
Plate prominence	3/20	0/0
Plate loosening	0/0	0/0
Delayed union	1/6.7	6/40
Non union	0/0	1/6.7
Plate breakage	0/0	0/0
Symptomatic malunion	0/0	3/20

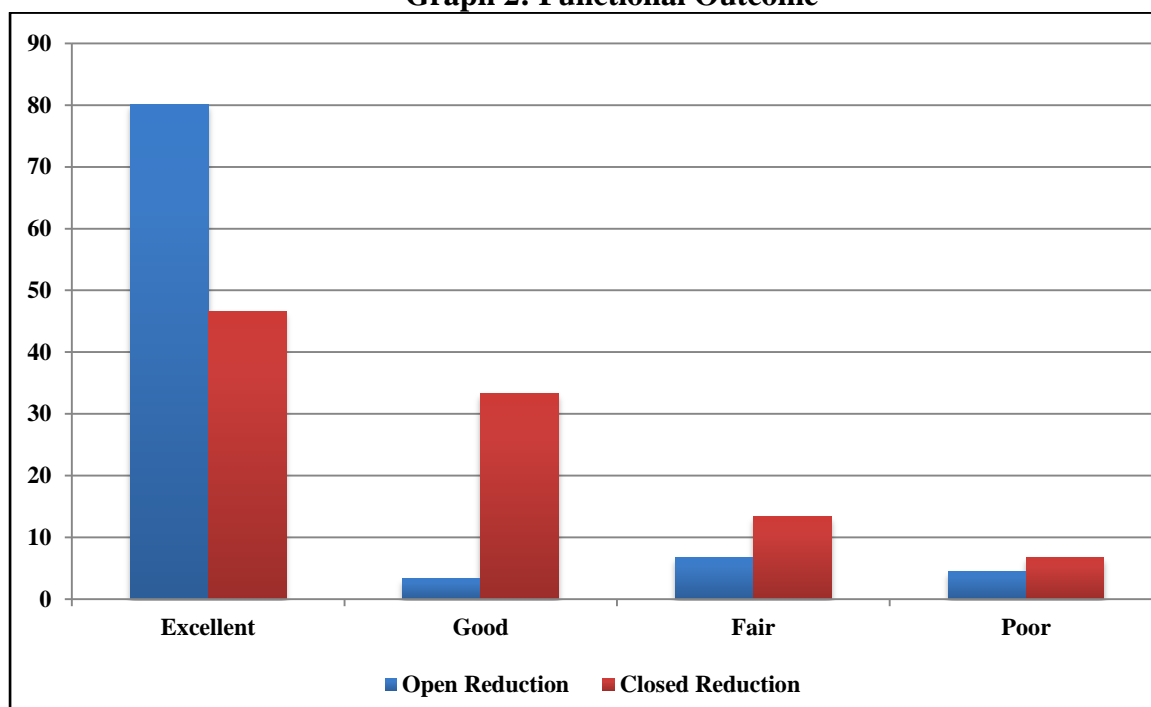
Table 3: Functional outcome

FUNCTIONAL OUTCOME	OPEN REDUCTION (n/%)	CLOSED REDUCTION (n/%)
Excellent	12/80	7/46.6
Good	2/13.3	5/33.3
Fair	1/6.7	2/13.3
Poor	0	1/6.7
Total	15/100	15/100

Graph 1: Complications Encountered During The Study



Graph 2: Functional Outcome



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