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A comparative study of functional outcome of operative versus non operative management of fracture clavicle

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Abstract

Objective: To compare functional outcome of Operative versus Non operative management of fracture clavicle.

Method: 30 cases of fracture clavicle mid-shaft fracture treated with conservative methods (Figure of eight, Clavicle brace) and operative methods (K-wire, Plating). Out of these, 15 cases in GROUP A underwent Conservative management and 15 cases in GROUP B operative management. Meticulous follow up was done to get data for the study.

Observations: In our study we found that constant shoulder functional score at final follow was more than 79 in GROUP A, and more than 89 in GROUP B. This value was statistically significant ($p < 0.05$). There were 9 cases (60%) in GROUP A and 14 cases (93.3%) in GROUP B whose constant score was in interval between 90-100. There was 1 case (6.66%) in both GROUPS who had there constant score in the interval between 80-89. There were 5 cases (33.3%) in GROUP A who had there constant score in interval between 70-79. The mean constant score in GROUP A was 86.87 with SD of 6.44 and in GROUP B mean was 94.7 with SD OF 2.12. The p value was statistically significant ($p < 0.001$).

Result: Conservative treatment is associated with increased incidence of shortening, malunion. Operative treatment is an effective alternative to conservative treatment of fracture mid-shaft clavicle, as it has comparable results in terms of union rate and complication.

Keywords: Clavicle fracture, clavicle fracture management, outcome, clavicle mid shaft-fracture

Introduction

Clavicle fractures are common injuries in young, active individuals, especially those who participate in activities or sports where high speed fall or violent collisions are frequent, and they account for approximately 2.6% of all fractures. Clavicle fractures are very common injuries in adults (2-5%) and children (10-15%) and represent the 44-66% of all shoulder fractures. Despite the high frequency the choice of proper treatment is still a challenge for the orthopedic surgeon [2].

The majority of clavicular fractures occurs in the mid-shaft of the bone, where the typical compressive forces applied to the shoulder and narrow cross section of the bone combine and result in bony failure [3]. There are numerous conservative treatment options available, the most common being the use of a sling or 'figure-of-eight' bandage (also known as figure-of-eight splint, or back- pack bandage), or a combination of these two methods [2].

Patient with displaced mid-shaft clavicle fractures treated non-operatively have a lower functional ability than the background population, as well as a thirty to fifty percent dissatisfaction rate with appearance or function of patient's shoulders.

Both plate fixation and intramedullary fixation have shown superior results regarding nonunion rates compared with non-operative treatment for Mid-shaft clavicle fractures in randomized controlled trials [9].

Open reduction and internal fixation of the clavicle has typically been reserved for fractures that are open, threaten the overlying skin, or go onto non-union after non-operative treatment. When open reduction is necessary several techniques exist which include wire or plate fixation and interosseous sutures. In general, Kirschner wire fixation has proven unsafe because of breakage and migration. By contrast, use of interosseous wires or suture and modified hooked Bessler plate fixation appears more successful but requires a second operation for hardware removal [2].

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Both surgical and non-surgical treatment can have unfavorable outcomes such as transient or permanent limb impairment, the need for immobilization, the need for a secondary procedure for implant removal, or symptomatic non-union or malunion [12].

Selecting the right treatment plan for fracture stabilization remains a controversy so we want to conduct a prospective, comparative study for the management of clavicle fracture to find out the ideal mode of management with their functional outcome.

Materials and methods

The present study was conducted in the department of orthopaedics surgery of SRMS-IMS, Bareilly from January 2016 to 2018 on 30 patients 15 each group having fracture clavicle, after obtaining approval from hospital ethics committee.

Inclusion criteria

1. Age of the patient more than 18 years.
2. Closed type of displaced clavicle fracture.
3. Patient medically fit to go undergo surgery.

Exclusion criteria

1. Age of the patient less than 18 years
2. Medically unfit.
3. Non-union from previous fracture
4. Fracture ends of clavicle
5. Open injury
6. Pathological fracture

All protocols and procedures applied in this study were as per guidelines of ethics committee of this institution.

All the patients of clavicle fracture were seen either at casualty or orthopaedic outpatient department. They were assessed for vascular and neurological status. All the clavicle fracture cases were admitted and were immobilized with shoulder immobilizer.

Methods of treatment

Non-operative methods

Traditionally, middle-third clavicle fractures have been treated conservatively, even when substantially displaced. A large number of methods to immobilise the region have been described.

- Figure Of Eight bandage or Clavicle Brace
- Shoulder Immobilizer
- Arm pouch

Operative methods

Kirschner wires

Drilling is considered a simple way of implanting, with many advantages, such as percutaneous and atraumatic insertion. However, this technique also has its disadvantages like temperature elevation, resulting in osteonecrosis and heat-related complications [50].

Titanium elastic nail

The use of an intramedullary device carries advantages of a smaller incision, less soft tissue dissection, load sharing

fixation with relative stability that encourages copious callus formation [12]. The titanium ESIN has been successfully used in fixation of pediatric long bone fractures. One advantage of the titanium ESIN is that it can block itself in the bone and provide a three- point fixation within the S-shaped clavicle.

Precontoured clavicle plate

The plates are designed to fit the anatomic shape of the natural clavicle, eliminating the need for plate contouring at the time of surgery, which decreases operative time and potentially lessens the risk of plate fatigue fracture.

Advise: Patient immobilize for at least 4-6 weeks.

Observation

- In present study, we have included 30 cases of fracture clavicle mid-shaft fracture treated with conservative methods (Figure of eight, Clavicle brace) and operative methods (K-wire, Plating) in the Department of Orthopaedics, Shri Ram Murti Smarak institute of Medical Sciences, Bareilly from November 2016 to July 2018. Out of these, 15 cases in GROUP A underwent Conservative management and 15 cases in GROUP B operative management. From the study conducted, the following observations were made.

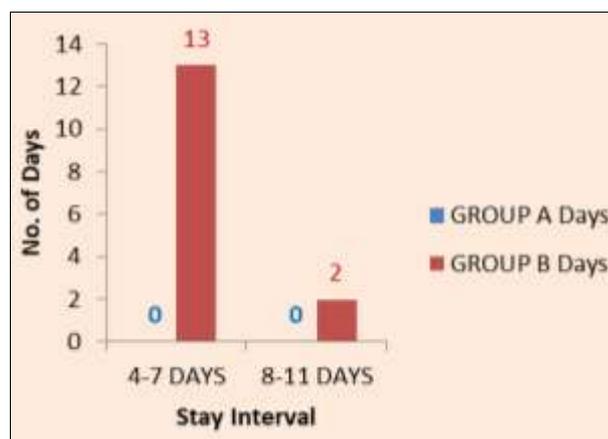


Fig 1: Stay in Hospital

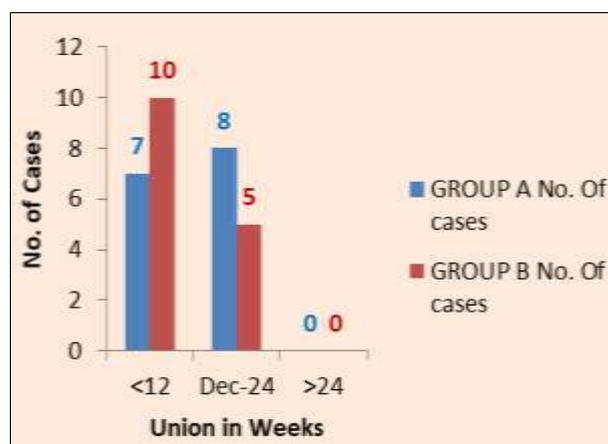


Fig 2: Time of Union

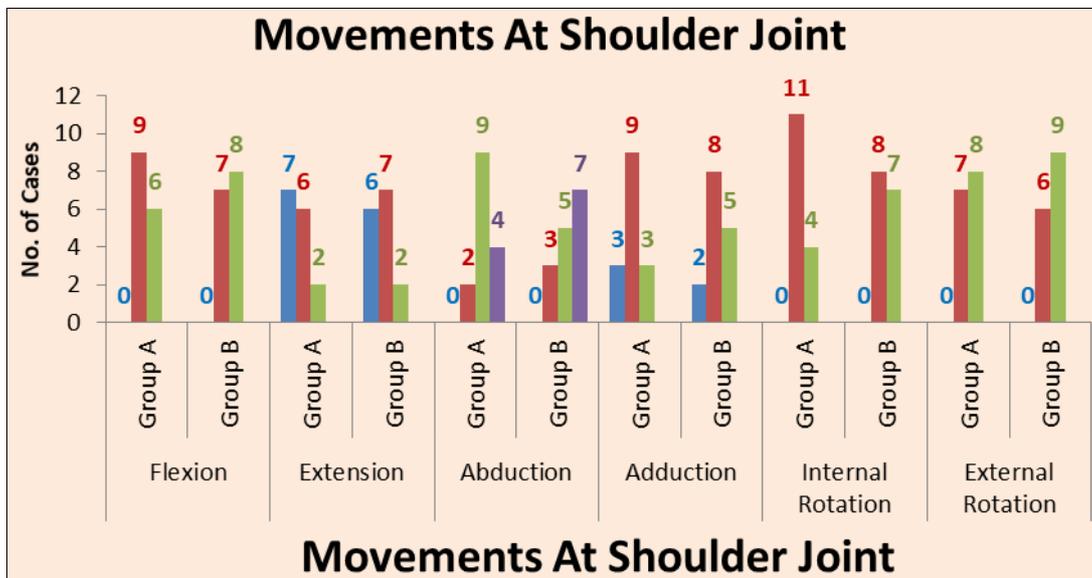


Fig 3: Movements At Shoulder Joint at 6 month

Table 1: Constant shoulder score at 6 month follow-up

Constant shoulder score	Group A (NOP)		Group B (OP)	
	No. of cases	Percent	No. of cases	Percent
90-100	9	60%	14	93.3%
80-89	1	6.6%	1	6.6%
70-79	5	33.3%	0	0
<69	0	0	0	0
Total	15	100%	15	100%

Table 2: Complications

Complications	Group A (NOP)		Group B (OP)	
	No. of cases	Percent	No. of cases	Percent
Shortening	5	33.3%	0	0%
Superficial infection	0	0%	3	20%
Implant failure	N/A	N/A	0	0%
Shoulder Stiffness	7	46.6%	9	60%
Non-union	1	6.66%	0	0%

Results

Table 3: Constant shoulder score at 6 month follow-up

Constant shoulder score	Group A (NOP)		Group B (OP)	
	No. of cases	Percent	No. of cases	Percent
90-100	9	60%	14	93.3%
80-89	1	6.6%	1	6.6%
70-79	5	33.3%	0	0
<69	0	0	0	0
TOTAL	15	100%	15	100%

In our study we found that constant shoulder functional score at final follow was more than 79 in Group A, and more than 89 in group B. This value was statistically significant ($p < 0.05$). There were 9 cases (60%) in Group A and 14 cases (93.3%) in group B whose constant score was in interval between 90-100. There was 1 case (6.66%) in both groups

who had there constant score in the interval between 80-89. There were 5 cases (33.3%) in Group A who had there constant score in interval between 70-79. The mean constant score in group A was 86.87 with SD of 6.44 and in group B mean was 94.7 with SD of 2.12. The p value was statistically significant ($p < 0.001$).

Case record



Discussion

Concepts in the management of trauma in Orthopaedics are very rapidly changing and to keep pace with the increasing severity and complexities of the fractures is a necessity.

It has been estimated that fractures of clavicle account for 1 in 20 of all fractures and 44% of all injuries to the shoulder girdle.

Traditionally, the treatment of clavicle fractures has been non-operative. Until recently, the literature reported a high rate of good outcomes with a low rate of non-unions following non-operative treatment, and there was no evidence of functional benefits resulting from surgery in comparison with non-operative treatment.

Nonsurgical treatment resulted in more residual clavicle shortening than surgery, which was expected as surgical procedures are directed at achieving the most anatomical reduction possible. Nevertheless, no difference in functional result was found between the groups. The relationship between shortening and functional results has been controversial, with 1 study denoting no functional deficit with shortening and another even suggesting that initial shortening is an indication for surgical treatment.

Keeping these controversies in mind, we conducted a study which included 30 cases of fracture mid-shaft clavicle treated with conservative or operative management. Patients were

randomly divided into 2 groups of 15 each.

In a comparative study done by J.C Van Der Van Denise *et al.* [44] on 97 patients the mean age was 40 years. Kiriakos Daniilidis *et al.* [39] in a cohort study of 151 cases with mean age of 40 years. B.M Naveen *et al.* [46] noted mean age of fracture mid-shaft clavicle was 35 years. Peter L Althauen *et al.* [41] in a study on 149 patients the mean age of 40 years. Canadian Orthopaedic Trauma society in prospective clinical trial of 132 cases with mean age of 33 years. Philip M Ahrens *et al.* [51] in a study on 230 patient of mid shaft clavicle fracture with mean age of 34 years. Nidhi Narsaria *et al.* [29] in study on 66 patients with the mean age of 40 years. Jamal E.H. Assobhi *et al.* [28] in study on 38 patient with the mean age of 32 years. In our study the maximum numbers of cases (80%) were in age group 20-35 years in GROUP A and also in group B (73.3%). The mean age in group A was 32 years with SD 11.8 and in group B the mean age was 30 years with SD 8.88. Our study was comparable with the literature regarding mean age of the patients sustaining fracture mid-shaft clavicle fracture.

In a comparative study done by B.M. Naveen *et al.* [46] 10 patient type B1 and 20 patient type B2 in conservative group and 15 patient type B1 and 15 patient type B2 in operative group. In our study there were 12 (80%) 2B1 Type and 2(20%) 2B2 type in group A and in group B 7 (46.6%) 2B1 Type and 8(53.3%) 2B2 type.

In a comparative study done by B.M. Naveen *et al.* [46] group 1 were managed conservatively on same day and In GROUP 2 all the patient treated within 7 days. In our study Time interval between trauma and surgery is not applicable in group A due to conservative management because all patient were outdoor. In GROUP B maximum cases were operated in ≤ 2 days 12 cases (80%) and 3 - 4 days 3 cases (20%).

In a comparative study done by Kelly L. Vander Have *et al.* [35] found the mean time of union in Non- operative Group was 8.7 weeks and in operative group 7.4 weeks. In our study we found that union time in weeks was in interval of ≤ 12 weeks, 7 cases (46.6%) in group A and 10 cases (66.6%) in group B. There was 8 case (53.3%) of delayed union (union between 12-24 weeks) in group A and 5 cases (33.3) in group B. The mean union time in group A was 12 weeks with SD of 4.9 and in group B was 12 weeks with SD of 2.23. The p value was significant between the 2 groups ($P < .03$).

In study done by Kiriakos Daniilidis *et al.* [39] reported mean constant score was 88.1 in conservative group and 91.7 in operative group. B.M. Naveen *et al.* [46] reported significantly higher constant score of operative group compared to conservative group. J.C. Van Der Ven Denise *et al.* [44] reported mean constant score was 90 in operative group and 78 in conservative group. By cots reported constant score of 96 in operative group and 90 in conservative group. C.M.

Robinson *et al.* [40] reported mean of constant score was 92 in operative group and 87.8 in conservative group. In our study we found that in our study we found that constant shoulder functional score at final follow up was more than 79 in group A, and more than 89 in group B. This value was statistically significant ($p < 0.05$). There were 9 cases (60%) in group A and 14 cases (93.3%) in GROUP B whose constant score was in interval between 90-100. There was 1 case (6.66%) in both groups who had their constant score in the interval between 80-89. There was 5 cases (33.3%) in group A who had their constant score was in interval between 70-79.

Conclusion

- In our study on fracture mid-shaft clavicle patient were randomly divided into conservative and operative groups, following conclusion are made.
- Fracture shaft clavicle are more common in males with peak incidence in the third decade of life.
- The mode of injury is usually a fall on ground following road traffic accident.
- Operative Time interval between trauma and Treatment is less in conservative group's comparison to operative groups.
- Hospital stay is not compared because all the conservative group of patients were outdoor patients.
- Conservative treatment is associated with increased incidence of shortening, malunion.
- Although internal fixation with plate may result in a better fracture reduction, it also carries soft tissue dissection with risk of infection and shoulder stiffness.
- Operative treatment is an effective alternative to conservative treatment of fracture mid-shaft clavicle, as it has comparable results in terms of union rate and complication.
- No single treatment is superior in all circumstances for a particular fracture and each case has to be individualized.

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