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Short term outcome evaluation of conservative versus operative treatment of middle third clavicle fractures: A prospective observational study

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Abstract
Background: The study was conducted to compare the short term outcome between conservative and operative management of middle third clavicle fractures.
Materials and Methods: 118 patients with displaced clavicle fractures of both genders were classified into 2 groups of 59 each. Group I patients were treated either by intramedullary nail or open reduction and internal fixation with plate-screw construct and group II patients were managed conservatively on clavicular brace. Patients were evaluated clinically, with the DASH questionnaire and the Constant score.
Results: There were 39 males and 20 females in group I and 32 males and 27 females in group II. The mean constant score was 94.2 in group I and 91.4 in group II, DASH score was 4.5 in group I and 3.2 in group I and malunion was seen in 5 in group I and 9 in in group II. The difference was significant ($P< 0.05$).
Conclusion: The operative group had significantly higher excellent outcome as compared to the conservative group.

Keywords: Clavicle, fractures, DASH score, constant score

Introduction
Clavicle fractures represents 2.5-10% of all fractures in adults. The risk is higher in young male patients aged less than 30 years and patients aged over 70 [1]. The main causes are a direct blow to the shoulder or a fall onto an outstretched hand, especially during sport activities or road traffic accidents. Middle third fracture represents 69% to 82% of all clavicle fractures and they often present some degree of displacement [2]. The treatment of choice, however, remains controversial as the conservative management is associated with high non-union rates, function deficits, shoulder shortening and poor cosmetic outcome. A surgical intervention is especially indicated for open fractures and in cases of neural disorders. Different surgical techniques have been described including an intramedullary stabilisation, screw fixation, K-wires or plate fixation [3].
Displaced middle third clavicle fractures result in poor clinical outcomes, which include decreased strength and range of motion (ROM), ongoing pain, and patient dissatisfaction, especially in conservatively treated patients [4]. Malunion of middle third clavicle fractures impairs shoulder biomechanics as well as, in some cases, causes neurovascular complications [5]. The present study was conducted to compare conservative and operative management of mid-third clavicle fractures.

Materials and Methods
The present study comprised of 118 patients with 2 displaced clavicle fractures fragments of both genders. The consent was obtained from all patients. Data such as name, age, gender etc. was recorded. They were classified into 2 groups of 59 each. Group I patients were treated either by intramedullary nail or open reduction and internal fixation with plate-screw construct and group II patients were managed conservatively on clavicular brace. Patients were evaluated clinically, with the DASH questionnaire and the Constant score.

DASH questionnaire was composed by 30 questions rated 1 to 5 regarding the upper limb ROM. The responses were rated by a scale from 0 to 100, with 0 indicating no loss of ROM and 100 indicating complete loss of ROM. The Constant score, a 100-points scale composed of a number of individual parameter, defines the level of pain and the ability to perform patient's normal daily activities. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table 1: Distribution of patients

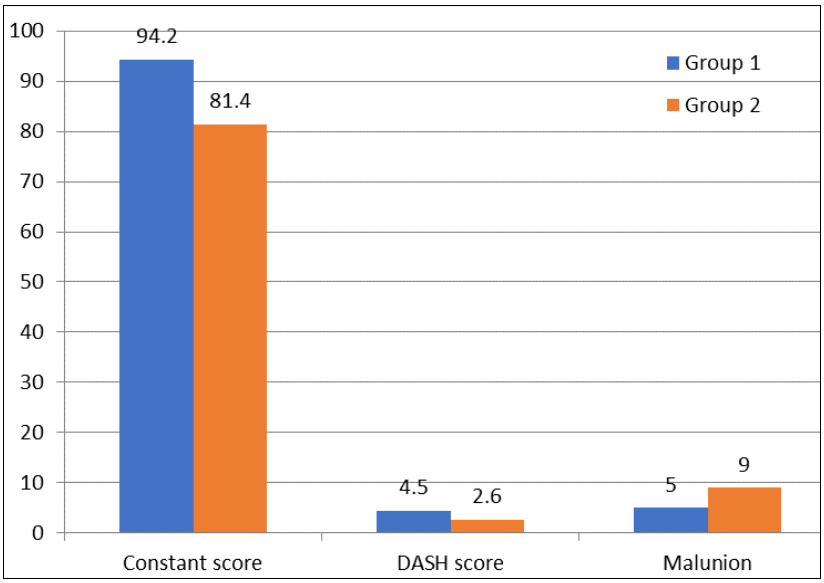
Groups	Group I	Group II
Status	Operative method	Conservative (figure of eight bandage) method
M:F	39:20	32:27

Table 2: Comparison of parameters

Parameters	Group I	Group II	P value
Constant score	94.2	81.4	<0.01
DASH score	4.5	2.6	<0.01
Malunion	5	9	0.04

Table 1 shows that there were 39 males and 20 females in group I and 32 males and 27 females in group 2.

Table 2, graph 1 shows that mean constant score was 94.2 in group I and 81.4 in group 2, DASH score was 4.5 in group I and 2.6 in group I and malunion was seen in 5 in group I and 9 in in group 2. The difference was significant (*P*< 0.05).



Graph 1: Comparison of parameters

Discussion

Clavicle fractures have an overall incidence of 64 out of 100,000 per year, occurring in up to 15% of all adult upper extremity fractures [6]. About 76% of all clavicle fractures affect the midshaft part and can be managed conservatively. Fractures of the lateral part of the clavicle remain still a clear surgical indication [7]. The present study was conducted to compare conservative and operative management of middle third clavicle fractures.

We found that there were 39 males and 20 females in group I and 32 males and 27 females in group II. Danillidis *et al.* [8] compared the outcome of the surgical and conservative procedure in 151 cases, 70 patients (46.4%) were treated conservatively (mean age 40.8y) and 81 (53.6%) underwent either surgical treatment with a locking compression plate (n = 73/mean age 40.3y) or an intramedullary nail system (n = 8, mean age 27.1y). Mean follow up was 15 months. Nine patients (5.9%) were lost to follow-up, due to poor compliance. The clinical outcome was assessed by the Disability of Arm, Shoulder and Hand (DASH) score and the Constant shoulder score. The average DASH score was 7.3 and the Constant score measured 91.7 in the surgical group. The conservative group achieved a DASH score of 11.1 and a Constant score of 88.1. The clinical scores showed a significant superiority for the benefit of the surgical treatment for the DASH (p = 0.037) and Constant score (p = 0.036). Totally nine patients had a non-union in the conservative group and six a hardware failure in the surgical group which were revised. DISCUSSION: The treatment options for midshaft clavicle fractures have to be discussed carefully for each patient with regard to the non-union risk, function, cosmesis and revision surgery.

We found that mean constant score was 94.2 in group I and 91.4 in group II, DASH score was 4.5 in group I and 3.2 in group I and malunion was seen in 5 in group I and 9 in in group II. Micheloni *et al.* [9] in their study 87 patients with 2 displaced clavicle fractures fragments (AO 15.2A) were included in the retrospective study, evaluating the clinical and functional outcomes and the complication rate with a follow-up average of 48 months. The risk of non-union resulted lower in the surgically treated patients. The Constant Score after 1 year was slightly better after the plate fixation (94,36 vs 91,36), while the DASH score resulted better in the conservatively treated patients (3,86 vs 4,63). The delay or revision surgery rates were similar for both groups and most of the complications were associated with the conservative treatment.

Robinson *et al.* [10] performed secondary plate fixation in 81% of patients with non union fracture after 6 months. In Schemistch [11] series for Canadian Orthopedic Trauma Society (COTS), all patients with a non- union after 1 year follow-up period, underwent plate fixation. Melean *et al.* [12] described secondary

plate fixation in all 4 patients with a non- union, but the timing was not listed. In the study by Woltz *et al*. [13], 5 patients were operated with a non-union within a follow-up period of 1 year, underlining that the patients with a non- union, who were about to undergo surgery, had a lower functional score than patients with a united fracture. Chen *et al*. [14] reported a case series of 41 patients (FU 14.5 mo.) which were treated with TENs. They showed that implantation of TENs consisted a safe procedure with good functional results and high patient satisfaction.

Conclusion

The operative group had significantly higher excellent outcome as compared to the conservative group, based on Constant and Murley score. The number of mal-union reported in the conservatively treated group was significantly more with that in the operative group. The average union time observed in the non-operative group was more as compared to that in the operative group. Thus, middle third clavicle fractures managed with operative modalities had a better outcome with much lesser post-operative complications.

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