

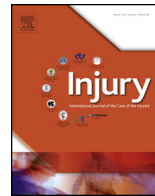


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Comparison of plate osteosynthesis versus non-operative management for mid-shaft clavicle fractures—A prospective study

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ABSTRACT

Introduction: Treatment for mid-shaft clavicle fractures has recently seen a paradigm shift towards surgical management. The aim of the study was to compare clinical and functional outcome between plate osteosynthesis and conservative line of management in middle-third clavicle fractures.

Material and methods: A prospective randomized study was conducted on 69 patients with closed displaced clavicle fractures between May 2014 and May 2016. Patients with medial or lateral third clavicle fractures, polytrauma and compound fractures were excluded from the study. Patients treated with plating were in group A (n = 36) while those treated with arm pouch were in group B (n = 33).

Results: The mean age of the patient in group A was 32.4 ± 43 and group B was 31.7 ± 26 years. 48 (69.9%) females were involved in the study. History of fall was the most common mechanism of injury affecting 51 (73.9%) patients. All the patients were type 2 B as per the Robinson classification system. The average operative duration was 78.3 ± 12.4 min. Union was seen at 15.6 ± 0.8 in group A and 22.8 ± 0.4 in group B ($p < 0.0001$). Two (6%) of the patients in group B had non-union. One (2.7%) patient in group A had mal-union. Two (5.5%) patients had plate prominence. One (2.7%) patient had superficial infection. The Constant and Murley scoring at 24 months was 89.42 and 76.24 in group A and group B respectively. **Conclusion:** Plating for displaced mid-shaft clavicle fractures is can lead to better functional and radiological outcomes with minimal complications as compared to the conservative modality of treatment.

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Introduction

Clavicle is the most commonly fractured bone, accounting for about 2.6%–4% of all fractures and 34%–35% of shoulder girdle injuries [1,2]. Amongst the clavicle fractures, middle third ones are the most common with an incidence of about 69%–81% [2,3]. Conservative treatment has remain the mainstay for managing these fractures until recently where the consensus is moving towards surgical intervention like plating or nailing. The present study aims to compare the operative and non-operative treatment modality for middle third clavicle fractures in terms of clinic-radiological outcome.

Materials and methods

A prospective randomized study was conducted at a tertiary care hospital on 69 patients with closed clavicle fractures over a

period of two years between May 2014 and May 2016. Skeletally matured patients with displaced closed clavicle fractures (Robinson type 2B) were included in the study. Patients with medial or lateral third clavicle fractures, polytrauma and compound fractures were excluded from the study. All the patients were classified as per the Robinson's classification for clavicle fractures [4]. Necessary work-up in the form of haematological and radiological investigation was done for all the patients enrolled for the study (Fig. 1). The patients were randomly divided in two different groups. The patients who were treated with surgical intervention in the form of plating were included in group A (n = 36) while the patients who were treated conservatively were in group B (n = 33). The patients in group A were treated with LCP Superior clavicle plate[®] (DePuy synthes, Switzerland) while the patients in group B were kept in arm pouch. The patients were randomized using the closed envelope technique. All the patients were explained in detail about both the treatment modalities and were asked to open the sealed radio opaque envelope after the agreed to participate in the study. All the envelopes were given by an independent person who was not a part of the study to avoid selection bias. A total of 72 patients met the inclusion criteria out of which 3 patients refused

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Fig. 1. Pre-operative Radiograph.



Fig. 2. Post-operative Radiograph.

to go for conservative treatment and thus were excluded from the study. Well written informed consent was obtained from all the patients. Ethical committee approval was taken before the commencement of the study.

Surgical technique

General combined with interscalene block was used for all the patients in group A. In supine position, a bolster was kept beneath the affected scapula. The skin over the clavicle was retracted inferiorly and about 5–8 cm transverse incision centered over the fracture site was taken. Subcutaneous tissue and platysma muscle was incised along the line of its fibres. The fracture site was exposed and temporarily reduced with the help of bone holding forceps. A 3.5 mm LC Pre-contoured plate was then applied over

the superior surface of clavicle. Minimum of six cortices were fixed on either side of the fracture fragment. The reduction was checked under C arm image intensifier and utmost care was taken to protect the underlying neurovascular structures. Meticulous closure of the wound was done (Fig. 2). All the patients were asked to use an arm pouch post-operatively for a period of two weeks. Gradual assisted passive mobilization was started as per the pain tolerance from post-operative day 2.

Conservative treatment

All the patients in group B were treated with an arm pouch for a period of 4 weeks. Gradual assisted passive mobilization was started then after as per the pain tolerance, but no strenuous work was allowed atleast for a period of 3 months after the initiation of the treatment.

Regular follow-up was done for all the patients at 1,3,6,12 and 24 months respectively. The final scoring was done as per the Constant and Murley scoring system [5].

Results

The mean age of the patient in group A was 32.4 ± 43 and group B was 31.7 ± 26 years. Thirty-six patients were treated with open reduction and internal fixation with superior plating while 33 patients were treated using arm pouch. There were 21 (30.4%) males and 48 (69.9%) females in the present study showing a female predominance. 43 (62.4%) patients had involvement of the dominant side. History of fall was the most common mechanism of injury affecting 51 (73.9%) patients followed by road traffic accidents. All the patients were type 2B as per the Robinson classification system which includes simple and fragmentary/wedge type fracture pattern. The average operative duration in group A was 78.3 ± 12.4 min. Union was said to occur when there was no tenderness clinically with radiological healing (callus formation around the fracture site) at subsequent follow-ups. It was seen at 15.6 ± 0.8 in group A and 22.8 ± 0.4 in group B respectively ($p < 0.0001$) which was statistically significant (Table 1). Two (6%) of the patients in group B had non-union (Fig. 3). One (2.7%) patient in group A and 3 (9%) patients in group B had mal-union (Fig. 4). Two (5.5%) patients had plate prominence. There was 1 (2.7%) patient with superficial infection which responded well to oral antibiotics (Table 2). There was 1 (2.7%) patient who had a fall 3 months after the surgery and came to us with implant breakage.

Functional outcome

The Constant and Murley scoring at the end of 24 months was 89.42 and 76.24 in group A and group B respectively which was statistically significant ($P < 0.0001$).

Table 1
Demographics and union.

Parameter	Group A (n = 36)	Group B (n = 33)	Test of significance	P value
Age	32.4 ± 43	31.7 ± 26	Two sample Independent t-test	0.9358
Sex			Chi square	0.1980
Male	08	13		
Female	28	20		
Mechanism of injury			Chi square	0.5445
Fall	25	26		
Road traffic accident	11	07		
Side involved			Chi square	0.9999
Dominant	24	19		
Non-dominant	14	12		
Radiological union	15.6 ± 0.8	22.8 ± 0.4	Two sample Independent t-test	0.0001 ^a

^a Statistically significant.

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