Original Article

A study of patients with middle third clavicle fractures as per treatment given and complications

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Abstract

Introduction: The method of treatment for clavicular fracture depends on several factors including, Age, Location of fracture, Fracture pattern, Medical condition of the patient Associated injuries. **Aims and Objectives:** To study patients with middle third clavicle fractures as per Treatment Given and Complications **Material and Methods:** The present study was conducted at the Department of orthopedics Sri Manakula Vinayagar Medical College And Hospital, Puducherry, from Jan 2008 to Sept 2012. The study consisted of a total of 58 patients of which 25 patients were retrospective and were assessed at the beginning of the study or at the end of 1 year. Prospectively 33 patients were studied totally 28 patients were completely analysed wherein 15 patients underwent plate fixation and 13 patients underwent titanium elastic nailing inserted through the sternal end of the clavicle. Statistical analysis done by Chi - Square test. **Result:** All the patients in plating group underwent ORIF. In the nailing group 53.8% patients underwent ORIF and only 46.2% needed CRIF. As per the Treatment the Complications like Delayed union i.e. 6.7% and 3.6; Nail prominence 0 %and 14.3 %; Shoulder stiffness 6.7% and 7.1% were found in PLATE and TENS Respectively but the Observed difference was not statistically significant . According to constant and murley scoring system for evaluating the functional results among the 28 patients 12 had excellent results with 4 (26.7%) patients in plating group and 8 patients (61.5%) in nailing group.12 patients had good results with 7 patients (46.7%) in plating group and 5 patients (38.5%) in nailing group.3 patients(20%) had fair results and one patient had poor result in plating group. On statistical analysis of the functional results no significant difference noted between the plating and nailing group (0.1356) **Conclusion:** The data of this study demonstrate that operative treatment of displaced midclavicular fractures with TENS, results in an excellent functional outcome. This technique provides more rapid free movement of the shoulder and an earlier return to daily activities than conservative management

Keywords: TENS, ORIF, PLATE, clavicle fractures, Complications clavicle fractures.

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INTRODUCTION

The method of treatment for clavicular fracture depends on several factors including, Age, Location of fracture, Fracture pattern, Medical condition of the patient Associated injuries. As the clavicle is a curvilinear bone, care should be taken to achieve anteroposterior and lateral alignment of the fracture. [1]In adults as in treatment of other fractures, it is essential to achieve bone healing with minimal morbidity and loss of function and residual deformity with the idea of early mobilization. Generally, the methods of treatment of fractured clavicles can be broadly classified into the following, Conservative or non-operative treatment. Operative treatment. Non-operative treatment: Historically, the main principles of non-operative treatment includes the following : Maintenance of reduction, Depression of the inner fragment . Bracing of the shoulder girdle which allows the raising of the lateral fragment upward, outward and backward. Use of an ipsilateral elbow and hand so that associated problems with immobilization can be avoided. Methods used: Figure-of-eight bandages, Broad arm sling. Treatment by figure-of-eight bandages: Application of figure of eight bandage operative treatment: The

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ultimate aim in the surgical management of clavicular fracture is to achieve a normal anatomical position of fractured fragments which allows for good range of movements and stability to the shoulder girdle . It can be achieved by any of the following methods: Intramedullary fixation, Internal fixation with plates and screw. Indications for operative treatment: Absolute indications- Polytrauma with multiple ipsilateral rib fractures and respiratory insufficiency, Bilateral clavicular fractures, Floating shoulder, Brachial plexus injury, Skin perforation or tenting of skin. Relative indications- Cosmesis, Young patients patients who do not want a sling and a brace for long period and want to return to their pre-injury status at the earliest. Displacement >150 % of diaphyseal width Clavicular shortening >1.5-2 cms. Fixation is rigid enough to allow the patient to minimum weight bear on the extremity or to use the arm for activities of daily living [2,4]. Despite these short comings plate fixation utilizing careful surgical techniques is an excellent method of treatment for mid clavicular fractures[2,3,4]. Complications**:** Malunion: In adults, the remodeling potential is poor and hence a marked shortening or angulation may occur after a displaced fracture of clavicle. Recent studies have shown patients with a shortening of more than 15 mm, have a significantly increased sense of pain and disability than those without[5]. Hence shortend clavicle is not recommended. Nonunion: Failure to show clinical or radiographic progression of healing at 4 to 6 months is referred to as clavicular non-union. At 14 weeks period as long as some potential for healing was present it is called delayed union. The incidence of non-union probably is much higher than previously thought and it is about 15% to 25%. Factors predisposing to non-union of the clavicle: Location of fracture, They are unstable, The muscle forces and weight of the arm tend to displace the fractured fragments. It is difficult to secure adequate external immobilization. These fractures usually result from severe trauma and usually associated with soft tissue injury. Severity of trauma, Degree of displacement, Inadequate immobilization: Primary open reduction: Extensive soft tissue dissection, periosteal stripping and infection have been attributed to high rate of non-union in fractures treated with internal fixation. But it is probable that the operative fractures also included difficult cases (those associated with severe trauma, soft tissue damage and associated injuries) thus contributing to the poor results. One cannot overlook the fact that most of the surgical complications are related to poor fixation techniques and it is not the concept of surgical treatment that is the problem but rather the choice of fixation. Refracture: Because the vascular anatomy of a fractured bone remains altered for a long period even after fracture union, reinjury might in some way prevent this altered blood supply from reaching the new fracture. Treatment is usually carried out with implant exchange, freshening of fracture site and adequate bone grafting[3,4,6].

MATERIAL AND METHODS

The present study was conducted at the Department of orthopaedics Pondicherry institute of medical sciences, Puducherry, from Jan 2008 to Sept 2012. The study consisted of a total of 58 patients of which 25 patients were retrospective and were assessed at the beginning of the study or at the end of 1 year. Prospectively 33 patients were studied. Among which 2 cases were lost to follow up, hence a total of 56 patients were studied and assessed at the end of one year. Patients between the age group of 18-60 years of age of both sexes. Displaced middle third fracture of clavicle based on Allman's classification .Floating shoulder injuries. Fractures presenting within 7 days of occurrence. Bilateral clavicle fracture included into study while Clavicle fractures other than middle third, Open fractures, Clavicle fractures associated with neurovascular injury. Patients not willing for surgical management. In this study we had used 3.5mm reconstruction plates, dynamic compression plates and anatomically precontoured locking plates, In that process of study totally 28 patients were completely analysed wherein 15 patients underwent plate fixation and 13 patients underwent titanium elastic nailing inserted through the sternal end of the clavicle. Statistical analysis done by Chi -Square test.

RESULT

Table 1: Distribution of the patients as per surgery done

Surgery	PLATE		TENS		TOTAL	
	No	Percentage	No	Percentage	No	Percentage
CR	0	0 %	6	46.2 %	6	21.4 %
OR	15	100.0 %	7	53.8 %	22	78.6 %
Total	15	100 %	13	100 %	28	100.0 %

All the patients in plating group underwent ORIF. In the nailing group 53.8% patients underwent ORIF and only 46.2% needed CRIF.

Table 2: Distribution of the Patients as per Complications

Complication	PLATE		TENS		TOTAL	
	No	Percentage	No	Percentage	No	Percentage
Delayed union	1	6.7	0	0	1	3.6
Nail prominence	0	0	4	30.8	4	14.3
Shoulder stiffness	1	6.7	1	7.7	2	7.1
Nil	13	86.7	8	61.5	21	75.0
Total	**15**	**100 %**	**13**	**100 %**	**28**	**100**

Test of significance $\chi^2 = 6.07$, df = 3, p value = 0.1078

As per the Treatment the Complications like Delayed union i.e. 6.7% and 3.6; Nail prominence 0 %and 14.3 %; Shoulder stiffness 6.7% and 7.1% were found in PLATE and TENS Respectively but the Observed difference was not statistically significant.

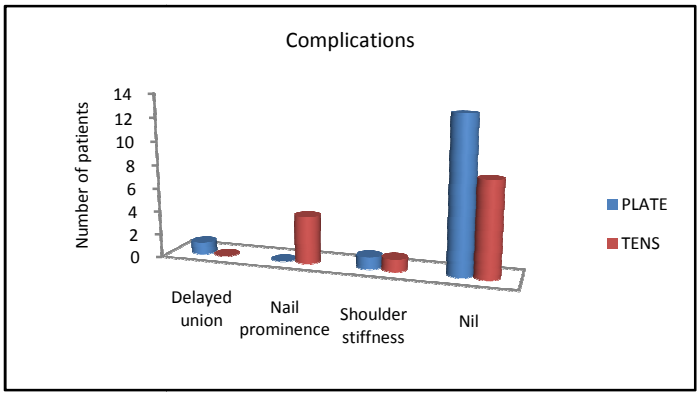

Table 3: Distribution of the Functional Results

Rating	PLATE		TENS		TOTAL	
	No	Percentage	No	Percentage	No	Percentage
Excellent	4	26.7	8	61.5	12	42.9
Good	7	46.7	5	38.5	12	42.9
Fair	3	20.0	0	0	3	10.7
Poor	1	6.7	0	0	1	3.6
Total	**15**	**100.0**	**13**	**100.0**	**28**	**100.0**

Test of significance $\chi^2 = 5.55$, df = 3, p value = 0.1356

According to constant and murley scoring system for evaluating the functional results among the 28 patients 12 had excellent results with 4 (26.7%) patients in plating group and 8 patients (61.5%) in nailing group.12 patients had good results with 7 patients (46.7%) in plating group and 5 patients (38.5%) in nailing group.3 patients (20%) had fair results and one patient had poor result in plating group. On statistical analysis of the functional results no significant difference noted between the plating and nailing group (0.1356)

DISCUSSION

Displaced and nonoperative treated clavicle fractures all heal with some degree of malunion secondary to angulation and shortening [7,8]. Although malunion is commonly asymptomatic and has traditionally been described as a pure cosmetic concern, recent studies have shown that functional limitations do occur[9]. Clavicular shortening of > 15 mm has been associated with shoulder discomfort and dysfunction and can change shoulder dynamics[9–11]. Malunion may also be symptomatic, producing pain, neurovascular compromise, and upper extremity weakness[12,13]. For these patients, late corrective osteotomy and plate fixation with bone grafting has been shown to improve symptoms related to their malunion[9,14].

Delayed union: Displaced and nonoperative treated clavicle fractures all heal with some degree of malunion secondary to angulation and shortening [15]. Although malunion is commonly asymptomatic and has traditionally been described as a pure cosmetic concern, recent studies have shown that functional limitations do occur[15]. Clavicular shortening of > 15 mm has been associated with shoulder discomfort and dysfunction and can change shoulder dynamics[5]. In this study among the 28 patients only 1 (1.8%) patient who underwent plating was found to have a delayed union, which was asymptomatic and was left alone. Implant prominence: The sternal ends of the TEN can cause skin irritation and pain. 3 cases were reported by F. Hartmann in his study

[16]. In this study a total of 4 cases of implant prominence was found at the sternal end of the nailing group. There could be two causes for the problem, one an insufficient cut of the TEN after the primary treatment. The other is the displacement of the TEN to the sternal end of the clavicle by secondary shortening of the clavicle. Secondary shortening or "telescoping" especially occurs in fractures with an intermediate zone of instability [17]
Functional outcome: The recovery of the shoulder function was assessed with the Constant shoulder Score. F. Hartmann in his study [16] using the constant score averaged 95.3 ± 3.9 points. In this study when the functional outcomes were compared between the two surgeries the mean functional outcome for the affected side was 81.04 +/_ 9.28 std deviation and the non-affected side was 90.84 +/ 2 std deviation. The test for significance between the two surgeries was done using the Mann Whitney U test which showed a p value of .516 which was not significant. Though the test for significance was > .05 it should be noted that 57.1% of the nailing had an excellent outcome compared to only 42.9 % in the plating group. More over 60 % had a good out come in nailing compared to plating with just 40%.this difference could be due to the small sample size and probably a larger sample size would reveal a significant p value.

CONCLUSION

The data of this study demonstrate that operative treatment of displaced midclavicular fractures with TENS, results in an excellent functional outcome. This technique provides more rapid free movement of the shoulder and an earlier return to daily activities than conservative management. In comparison with plate fixation, the procedure is less invasive and requires smaller incisions and a shorter duration of hospital stay. Hence the TENS technique is recommended for the fixation of displaced mid-shaft clavicular fractures, especially for young active individuals and can be used as an alternative to plate fixation.

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