

A Comparative Evaluation of Rockwood Pins and Dynamic Compression Plating in Management of Clavicular Fractures

K. Jagan Mohan¹, C Vidyasagar Reddy²

¹Associate Professor, Department of Orthopaedics, Fathima Institute of Medical Sciences, Kadapa, Andhra Pradesh, India.

²Assistant Professor, Department of Orthopaedics, Fathima Institute of Medical Sciences, Kadapa, Andhra Pradesh, India.

Received: February 2015

Accepted: March 2015

ABSTRACT

Background: Aim: To compare clavicle pin and plating in management of displaced and shortened mid-clavicle fractures. **Methods:** 60 cases of displaced and shortened mid-clavicle fractures (males- 40, females- 20) were included. Patients were divided into two groups. Group A patients were treated with Rockwood clavicle pins and group B patients were treated with low-contact dynamic compression plate. Outcome of treatment was compared. **Results:** It was found that the mode of injury was road traffic accident seen in 14 in group A and 15 in group B followed by physical violence in 10 in group A and 8 in group B patients and fall seen in 6 in group A and 7 in group B. A significant difference in both groups was observed ($P < 0.05$). ASES score subjective pain value was 9.8 in group A and 9.0 in group B, activity score was 29.7 in group A and 28.1 in group B, ASES core objective range of motion was 41.1 degree in group A and 40.5 degree in group B, strength was 20.3 in group A and 20.0 in group B. A significant difference was seen in both groups ($P < 0.05$). **Conclusion:** Rockwood clavicle pins found to be better as compared to dynamic compression plate in patients with displaced and shortened mid-clavicle fractures.

Keywords: Clavicle, Dynamic compression plate, Rockwood clavicle pins, Physical violence.

INTRODUCTION

Clavicular fracture is one of the most common bone fractures which accounts approximately 2.6%-4% of adult fractures and 35% of injuries to the shoulder girdle.^[1] It is observed that 70%- 80% occur in the mid third. In young adults and in athletics displaced and shortened fractures of the mid third of the clavicle are common. The most common cause of clavicle fractures are road traffic accidents or sports injuries.^[2]

The clavicle is an S-shaped bone that acts as a strut between the sternum and the glenohumeral joint. It also has a suspensory function to the shoulder girdle.^[3] The shoulder hangs from the clavicle by the coracoclavicular ligament. Allman classification of clavicular fractures is the most commonly used and is divided into 3 groups such as middle-third fractures, lateral-third fractures and medial- third fractures.^[4] The common findings of patients with clavicle fracture are pain over the affected clavicle and deformity depending on the extent of displacement. Dyspnea, weakness, paresthesia or paralysis and difficulty swallowing or speaking due to from injury to trachea or esophagus in medial clavicle fractures with displacement are common symptoms.^[5]

Treatment modalities of clavicle fracture can be either conservative or non- conservative. In conservative modality various methods are available such as in the form of brace, figure of 8 bandage, arm sling or operative treatment in the form of open reduction and internal fixation with screws and plate construct using locking, non-locking or combination of both.^[6] The present study aimed at comparing clavicle pin and plating in management of displaced and shortened mid-clavicle fractures.

MATERIALS AND METHODS

60 cases of displaced and shortened mid-clavicle fractures (males- 40, females- 20) visiting the orthopaedics department were included in the study. All patients agreed to participated in the study and their written consent was taken.

A case history proforma was developed and parameters such as patients age, name, sex etc. were recorded. A clinical evaluation was done. Patients were divided into two groups and each group had 30 cases. Group A patients were treated with Rockwood clavicle pins and group B patients were treated with low-contact dynamic compression plate. Parameters such as mode of injury, and the functional outcome was evaluated using the American Shoulder and Elbow Surgeons (ASES) score and Constant score. Radiographs were taken in every case. Results of the were assessed using ANOVA test. Level of significance was below 0.05.

Name & Address of Corresponding Author

Dr C Vidyasagar Reddy,
Assistant Professor,
Department of Orthopaedics,
Fathima Institute of Medical Sciences,
Kadapa, Andhra Pradesh, India.

RESULTS

Table 1: Grouping of patients

Groups	Group A	Group B
Method	Rockwood clavicle pins	Dynamic compression plate
Male	18 (30%)	22 (36.7%)
Female	12 (20%)	8 (13.4%)

There were 18 (30%) male and 12 (20%) females in group A and 22 (36.7%) male and 8 (13.4%) females in group B [Table 1].

Table 2: Mode of injury

Mode	Group A	Group B	P value
Road side accident	14	15	Significant <0.05
Physical violence	10	8	
Fall	6	7	

The mode of injury was road traffic accident seen in 14 in group A and 15 in group B followed by physical violence in 10 in group A and 8 in group B patients and fall seen in 6 in group A and 7 in group B. A significant difference in both groups was observed (P<0.05) [Table 2].

Table 3 Comparison of ASES and constant score

Variables	Parameters	Group A	Group B	P value
ASES score Subjective	Pain	9.8	9.0	Significant <0.05
	Activity	29.7	28.1	Significant <0.05
ASES score Objective	Range of motion	41.1	40.5	Significant <0.05
	Strength	20.3	20.0	Non-significant >0.05

ASES score subjective pain value was 9.8 in group A and 9.0 in group B, activity score was 29.7 in group A and 28.1 in group B, ASES core objective range of motion was 41.1 degree in group A and 40.5 degree in group B, strength was 20.3 in group A and 20.0 in group B. A significant difference was seen in both groups (P<0.05) [Table 3, Figure 1].



Figure 1:

DISCUSSION

Clavicle fractures are common injuries, accounting for 8-15% of all fractures in children and adults.

The reason can be direct trauma, falls on the shoulder, or falls onto an outstretched arm.7 Clavicle fractures occur at three locations mid-shaft clavicle fractures which is the most common one seen in 85% of all cases, lateral clavicle fractures seen in 10-15% which is further of type 1 – lateral to the coraco-clavicular (CC) ligaments, type 2 – medial to the CC ligaments and type 3 – intra-articular fracture extending into the acromioclavicular (AC) joint and medial clavicle fractures seen less than 5% of cases which shows anterior displacement and posterior displacement.^[8] Numerous studies comparing different treatment modalities of clavicular fractures have been conducted.^[9,10] Considering this, we undertook a study in 60 patients managed with clavicular pins and plating.

There were 18 (30%) males and 12 (20%) females in group A and 22 (36.7%) males and 8 (13.4%) females in group B. Group A patients were treated with pins and group B with plating. Thyragarajan et al,^[11] assessed 51 patients with mid shaft clavicle fractures. Group 1 underwent intramedullary stabilization using clavicle pins. Group 2 underwent open reduction and internal fixation using plates and group 3 underwent non operative treatment with a sling. Group 1 patients progressed to union within 8 to 12 weeks. In Group 2, six patients had scar related pain and two had prominent metal work and discomfort and in group 3, three patients developed non-union and one had symptomatic malunion. Results showed that the displaced and shortened midshaft clavicle fractures require operative fixation and the techniques of clavicle pinning resulted in less complications, short hospital stay and good functional outcome.

In our study, it was seen that the mode of injury was road traffic accident seen in 14 in group A and 15 in group B followed by physical violence in 10 in group A and 8 in group B patients and fall seen in 6 in group A and 7 in group B. Dugar et al,^[12] compared treatment outcome in 30 patients with clavicle fractures divided into operative treatment or non-operative group. Each group had 15 patients. It was found that the mean follow-up of both groups were 12.56 months. DASH scores were significantly improved in the operative fixation group. The mean time to radiographic union was 15.73 weeks in the operative group and 27.46 weeks in the non-operative group. 7 patients in the non-operative group and none in the operative group revealed symptomatic malunion. Hardware-irritation and incisional numbness 1 each was complications in the operative group. The patients in the operative group were more satisfied with the appearance of the shoulder (p = 0.039) and with the shoulder in general than were those in the non-operative group. There were no differences between the two groups with respect to patient age, sex, side of injury or associated injuries.

In our study, ASES score subjective pain value was 9.8 in group A and 9.0 in group B, activity score was 29.7 in group A and 28.1 in group B, ASES core objective range of motion was 41.1 degree in group A and 40.5 degree in group B, strength was 20.3 in group A and 20.0 in group B. Phanswal et al studied 20 patients who were operated and 20 were managed conservatively. The average union time in operative group was 7.8 weeks and in conservative group was 9.4 weeks. 1 patient in conservative group had non-union. Mal-union was present in conservative group. Out of these patients with mal-union 1 had poor functional outcome, 3 had good to excellent outcome and 3 had satisfactory functional outcome. 4 of these had restricted movements terminally and 2 had pain on movement.

CONCLUSION

Results of the present study showed that Rockwood clavicle pins found to be better as compared to dynamic compression plate in patients with displaced and shortened mid-clavicle fractures.

REFERENCES

1. Pearson AM, Tosteson AN, Koval KJ, McKee MD, Cantu RV, Bell JE, et al. Is surgery for displaced, midshaft clavicle fractures in adults cost-effective. Results based on a multicenter randomized, controlled trial. *J Orthop Trauma* 2010;24: 426-33.
2. Postacchini F, Gumina S, De Santis P, Albo F. Epidemiology of clavicle fractures. *J Shoulder Elbow Surg* 2002;11:452-6.
3. Zlowodzki M, Zelle BA, Cole PA, Jeray K, McKee MD. Treatment of acute midshaft clavicle fractures: Systematic review of 2144 fractures. *J Orthop Trauma* 2005;19: 504-7.
4. Schiffer G, Faymonville C, Skouras E, Andermahr J, Jubel A. Midclavicular fracture: Not just a trivial injury current treatment options. *DtschArztebl Int.* 2010; 107(41):711-7.
5. Wun- JerShen MD, Tsung Jen Liu MD, Young ShungShen MD. Po Cheng Orthopaedic Institute, 100 Po-Ai 2nd Road, Kaohsiung, 813, Taiwan. Plate Fixation of Fresh Displaced Midshaft Clavicle Fractures, *J Bone Joint Surg[Br]*. 2008; 90- B:1495.
6. Neer CS 2nd. Non-union of the clavicle. *JAMA.* 1960; 172:1006-11.
7. McKee MD, Pedersen EM et al. Deficits following nonoperative treatment of displaced midshaft clavicular fractures. *J Bone Joint Surg Am* 88(1): 35-40.
8. Gille J, Schulz A, Wallstabe S, Unger A, Voigt C, Faschingbauer M. Hook plate for medial clavicle fracture. *Indian J Orthop* 2010;44:221-3. 9. Thyagarajan DS, Day M, Dent C, Williams R, Evans R. Treatment of mid-shaft clavicle fractures: A comparative study. *Int J Shoulder Surg* 2009;3:23-7.
9. Kumar AP, Reddy PS, Ramesh G, Reddy JS, Ahmed SMW. A Comparative Study of Functional Outcome of Clavicular Fractures Treated By Operative and Non Operative Methods. *Ann. Int. Med. Den. Res.* 2017; 3(4): 01-05.
10. Boehme D, Curtis JR, DeHaan JT, Kay S, Young DC, Rockwood CA. non-Union of fractures of the mid-shaft of the clavicle. Treatment with a modified Hagie intramedullary pin and autogenous bone grafting. *J Bone Joint Surg Am.* 1991;73:1219-26.
11. Thyagarajan DS, Day M, Dent C, Williams R, Evans R. Treatment of mid-shaft clavicle fractures: A comparative study. *Int J Shoulder Surg* 2009;3:23-7.
12. Dugar N, Hossain E, Bandyopadhyay U, Shaw R. A comparative study of non-operative and operative management in fracture clavicle. *Journal of the Indian Medical Association.* 2013 Dec 1;111(12):806-8.
13. Phanswal V. Comparative study of conservative vs surgical management of clavicle fractures. *Gal Int J Health Sci Res.* 2021; 6(1): 1-5.

How to cite this article: Mohan KJ, Reddy CV. A Comparative Evaluation of Rockwood Pins and Dynamic Compression Plating in Management of Clavicular Fractures. *Ann. Int. Med. Den. Res.* 2015;1(1):78-80.

Source of Support: Nil, **Conflict of Interest:** None declared