

# ORIGINAL ARTICLE

## Clavicle fractures management with locking plates- A clinical study

Jai Prakash Saraswat

Assistant Professor, Department of Orthopaedics, Major S D Singh Medical College & Hospital, Farrukhabad, U.P, India

### ABSTRACT:

**Background:** Fractures of the clavicle are common injuries of adults, accounting for about 3% of all injuries. The present study evaluated outcome of clavicle fractures managed with locking plates. **Materials & Methods:** 85 patients of clavicle fractures of both genders were enrolled. Open reduction and internal fixation were performed using a 3.5 mm locking plate with lateral extension. The postoperative pain was assessed with visual analogue scale (VAS) on postoperative days 1, 3 and 10. **Results:** Out of 85 patients, males were 50 and females were 35. Side involved was right in 46, left in 10 and both in 29 patients. The mode of injury was RTA in 60, fall in 20 and violence in 5 cases. The difference was significant ( $P < 0.05$ ). The mean VAS on day 1 was 5.7, on day 3 was 3.2 and on day 10 was 0. The mean DASH at 2 months was 12.1 and at 6 months was 4.7. Functional outcome was excellent in 42, good in 31 and moderate in 12 cases. The difference was significant ( $P < 0.05$ ). **Conclusion:** Clavicle fracture is common among all age groups. Compression plating found to be effective in the management of distal end clavicle fractures.

**Key words:** Clavicle, Fractures, Locking plate

**Corresponding author:** Jai Prakash Saraswat, Assistant Professor, Department of Orthopaedics, Major S D Singh Medical College & Hospital, Farrukhabad, U.P, India

**This article may be cited as:** Saraswat JP. Clavicle fractures management with locking plates- A clinical study. J Adv Med Dent Scie Res 2015;3(1):306-308.

### INTRODUCTION

Fractures of the clavicle are common injuries of adults, accounting for about 3% of all injuries. They are often caused by either a direct blow to the anterior chest wall or by a fall on the outstretched hand.<sup>1</sup> The commonest site of fracture in clavicle is the midshaft followed by the lateral end, which accounts for about 25% of all the clavicle fractures.<sup>2</sup> Twenty-five percent of these fractures are unstable due to the displacing forces acting on the fracture fragments: an inferior force on the lateral clavicle fracture fragment and an anterosuperior force on the medial clavicle fragment.<sup>3</sup> Approximately 75 % of these fractures are located in the middle third of the clavicle, with the majority of fractures being displaced. Despite the relative high prevalence of clavicle fractures, the optimal treatment of displaced mid-shaft clavicle fractures remains a matter for debate.<sup>4</sup>

Many operative treatment modalities have been tried for the management of lateral clavicle fracture including coracoclavicular screws, Kirschner wires, tension bands, hook plates, non locked and locked plates.<sup>5</sup> The combined use of a

coracoclavicular suture anchor and locking plate and the use of a locking plate alone for this type of injury were both reported to achieve good clinical outcomes.<sup>6</sup> The present study evaluated outcome of clavicle fractures managed with locking plates.

### MATERIALS & METHODS

The present study comprised of 85 patients of clavicle fractures of both genders. All were informed regarding the study and their written consent was taken.

Data such as name, age, gender etc. was recorded. Open reduction and internal fixation were performed using a 3.5 mm locking plate with lateral extension. The postoperative pain was assessed using Visual Analogue Scale (VAS) on postoperative days 1, 3 and 10. Disabilities of the Arm, Shoulder and Hand (DASH) scoring system was used for the assessment of the functional outcome was assessed at the end of 2nd and 6th months. Results were analysed statistically. P value less than 0.05 was considered significant.

### RESULTS

**Table I Patient distribution**

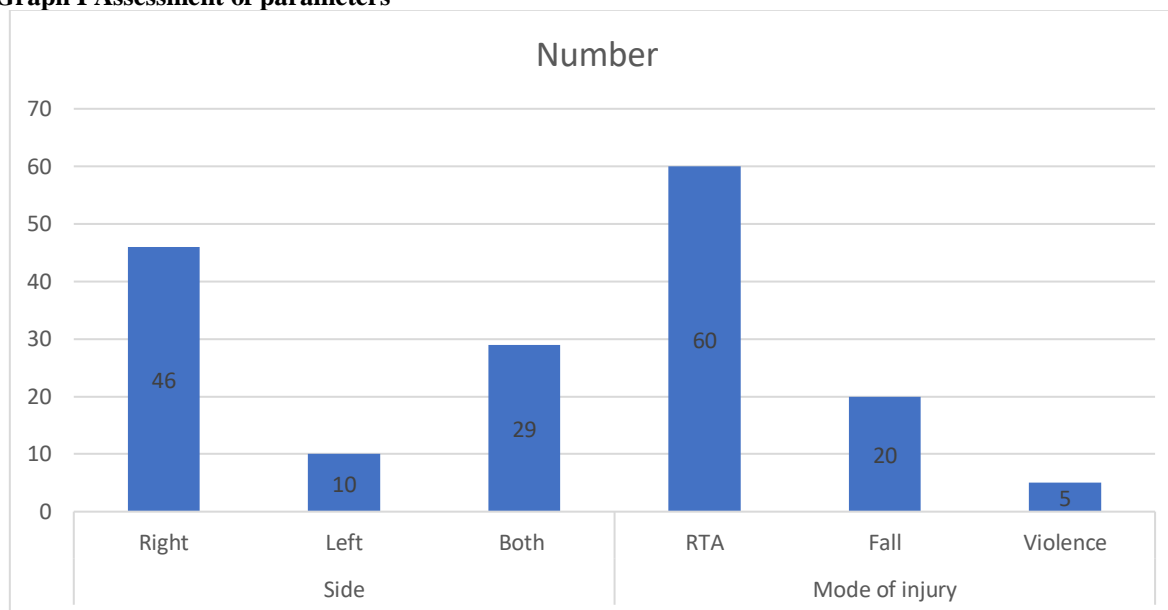
Total- 85		
Gender	Male	Female
Number	50	35

Table I shows that out of 85 patients, males were 50 and females were 35.

**Table II Assessment of parameters**

Parameters	Variables	Number	P value
Side	Right	46	0.01
	Left	10	
	Both	29	
Mode of injury	RTA	60	
	Fall	20	
	Violence	5	

Table II, graph I shows that side involved was right in 46, left in 10 and both in 29 patients. The mode of injury was RTA in 60, fall in 20 and violence in 5 cases. The difference was significant ( $P < 0.05$ ).

**Graph I Assessment of parameters****Table III Assessment of score**

Score	Variables	Number	P value
VAS	Day 1	5.7	0.04
	Day 3	3.2	
	Day 10	0	
DASH	2 months	12.1	0.01
	6 months	4.7	
Functional outcome	Excellent	42	0.05
	Good	31	
	Moderate	12	

Table III shows that mean VAS on day1 was 5.7, on day 3 was 3.2 and on day 10 was 0. The mean DASH at 2 months was 12.1 and at 6 months was 4.7. Functional outcome was excellent in 42, good in 31 and moderate in 12 cases. The difference was significant ( $P < 0.05$ ).

## DISCUSSION

The lateral fractured fragment is small and hence, it is difficult to get an anatomical reduction and also poses problems in its fixation, which results in instability of the lateral clavicle fractures.<sup>7</sup> Many treatment modalities have been used for the management of such fractures. Nonoperative methods are associated with high rates of non-union (22%–50%), out of which 14% cases were symptomatic.<sup>8</sup> Clavicle fractures are one of the most common injuries in an adult population.<sup>9</sup> It is also commonly associated with injuries to ribs, head and the upper extremities. These fractures are being encountered increasingly due to

increase in high-velocity trauma as seen in the young population.<sup>10,11</sup> The present study evaluated outcome of clavicle fractures managed with locking plates.

We found that out of 85 patients, males were 50 and females were 35. Kalamaras et al<sup>12</sup> were the first to report the concept of locking plate in distal clavicle fracture in their study where distal radius locking plate was used and finally concluded that the use of the locking plate gave good results and was promising for the management of the lateral clavicle fracture as it showed to have a better control on the distal fracture fragment.

We observed that side involved was right in 46, left in 10 and both in 29 patients. The mode of injury was RTA in 60, fall in 20 and violence in 5 cases. Klein SM<sup>13</sup> reported the method of using both a locking plate and a suture anchor and considered the method to be a good method.

We found that the mean VAS on day 1 was 5.7, on day 3 was 3.2 and on day 10 was 0. The mean DASH at 2 months was 12.1 and at 6 months was 4.7. Functional outcome was excellent in 42, good in 31 and moderate in 12 cases. Rieser et al<sup>14</sup> assessed the biomechanical analysis of the lateral clavicle fracture treated with the help of various treatment modalities and reported that locking plate fixation provided a stable fixation biomechanically and the clinical outcome was also satisfactory. Hence, it was assumed that the lateral end clavicle plate was biomechanically stable and would give good results in the fracture fixation of the small distal fragments of the Neer's type II fractures.

In a comparative study done by Chunlin et al<sup>15</sup>, the LCP plate was compared with the hook plate and in 66 patients (30 done by hook plate and 36 done by locking plate) it was seen that the clinical outcome was better in locking plate as compared to hook plate. Sajid et al<sup>16</sup> in their study 4 cases of lateral clavicle fractures were treated with the help of different modalities of treatment including lateral clavicle locking with bone grafting, lateral clavicle locking plate alone, lateral clavicle locking compression plate system and Small Fragment Locking Compression Plate System (Synthes™) and they recommended that the locking plate should be augmented with the coracoclavicular sling.

## CONCLUSION

Authors found that clavicle fracture is common among all age groups. Compression plating found to be effective in the management of distal end clavicle fractures.

## REFERENCES

1. Pai HT, Lee YS, Cheng CY. Surgical treatment of midclavicular fractures in the elderly: A comparison of locking and nonlocking plates. *Orthopedics* 2009;32(4)
2. Robinson CM. Fractures of the clavicle in the adult. Epidemiology and classification. *J Bone Joint Surg Br.* 1998;80(3):476–84.
3. Nordqvist A., Petersson C., Redlund- Johnell I. The natural course of lateral clavicle fracture. 15 (11–21)
4. year follow-up of 110 cases. *Acta Orthop Scand.* 1993;64:87–91.
5. Canadian Orthopaedic Trauma Society Nonoperative treatment compared with plate fixation of displaced midshaft clavicular fractures. A multi-center, randomized clinical trial. *J Bone Joint Surg Am.* 2007;89(1):1–10.
5. Rokito A.S., Zuckerman J.D., Shaari J.M. A comparison of nonoperative and operative treatment of type II distal clavicle fractures. *Bull Hosp Jt Dis.* 2002;61:32–39.
6. Ballmer F.T., Gerber C. Coracoclavicular screw fixation for unstable fractures of the distal clavicle. A report of five cases. *J Bone Jt Surg Br.* 1991;73:291–294.
7. Macheras G., Kateros K.T., Savvidou O.D. Coracoclavicular screw fixation for unstable distal clavicle fractures. *Orthopedics.* 2005;28:693–696.
8. Yamaguchi H., Arakawa H., Kobayashi M. Results of the Bosworth method for unstable fractures of the distal clavicle. *Int Orthop.* 1998;22:366–368.
9. Levy O. Simple, minimally invasive surgical technique for treatment of type 2 fractures of the distal clavicle. *J Shoulder Elb Surg.* 2003;12:24–28.
10. Shin S.J., Roh K.J., Kim J.O. Treatment of unstable distal clavicle fractures using two suture anchors and suture tension bands. *Injury.* 2009;40:1308–1312.
11. Fridberg M, Ban I, Issa Z, Krashennikoff M, Troelsen A. Locking plate osteosynthesis of clavicle fractures: complication and reoperation rates in one hundred and five consecutive cases. *International orthopaedics.* 2013 Apr;37(4):689–92.
12. Kalamaras M., Cutbush K., Robinson M. A method for internal fixation of unstable distal clavicle fractures: early observations using a new technique. *J Shoulder Elb Surg.* 2008;17:60–62.
13. Klein S.M., Badman B.L., Keating C.J., Devinney D.S., Frankle M.A., Mighell M.A. Results of surgical treatment for unstable distal clavicular fractures. *J Shoulder Elb Surg.* 2010;19:1049–1055.
14. Rieser G.R., Edwards K., Gould G.C. Distal-third clavicle fracture fixation: a biomechanical evaluation of fixation. *J Shoulder Elb Surg.* 2012;22:848–855.
15. Chunlin Z., Junwu H., Yi L. Comparison of the efficacy of a distal clavicular locking plate versus a clavicular hook plate in the treatment of unstable distal clavicle fractures and a systematic literature review. *Int Orthop.* 2014;38:1461–1468.
16. Sajid S., Fawdington R., Sinha M. Locking plates for displaced fractures of the lateral end of clavicle: potential pitfalls. *Int J Shoulder Surg.* 2012;6(4):126–129.