DOI: http://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20172882

Original Research Article

Comparing functional outcome in lateral end clavicle fracture after conservative and plating

Sachin Y. Kale, Prasad Chaudhari, Shikhar D. Singh*, Sanjay B. Dhar, Prakash D. Samant, Abhijit Tayade

Department of Orthopedics, DY Patil Medical College, Navi Mumbai, India

Received: 04 April 2017
Revised: 10 May 2017
Accepted: 19 May 2017

***Correspondence:**
Dr. Shikhar D. Singh,
E-mail: drsinghshikhar@gmail.com

ABSTRACT

Background: Fractures of the clavicle have been traditionally treated non- operatively but has been associated with various postoperative complications. In this study, we analyzed the outcomes of the operative management and compare its results with conservative treatment considering it as standard treatment option.
Methods: The present study was carried out at the Department of Orthopedics, DY Patil Medical College and Hospital, Navi Mumbai. Open fractures, fractures associated with complication like head injury with associated other bone injuries were included in this study. We excluded patients less than 18 years of age, patients with middle third fracture of clavicle and patients with medial end clavicle fracture. The fractures were classified according to Robinson's classification. Patients were followed up every week for 4 weeks then at 8 weeks, 12 weeks, 6 months and 1 year. The functional outcomes were assessed by Constant and Murley score.
Results: We included 48 patients in the study, 34 of which were males, average age of the patients was 37.53±7.64 years. 23 injuries were on the left. There was statistically significant better union times with operative management (p=0.034). Various complications were observed like infection, implant failure, man union, non-union, deformity and skin infections, statistically seen more in patients who underwent conservative management. Overall, patients experienced excellent and good results with operative management in 6 and 12 patients respectively.
Conclusions: Operative treatment gave statistically significant functional outcome and early healing compared to conservatively treated in displaced, communited lateral end clavicle fractures.

Keywords: Clavicle, Conservative management, Plating, Fracture

INTRODUCTION

Clavicle fracture is a common traumatic injury around shoulder girdle due to its subcutaneous position. Fracture of the clavicle accounts for approximately 5 to 10% of all the fractures and up to 44% of injuries to the shoulder girdle. About 70% to 80% of these fractures are in the middle third of the bone and less often in the lateral third (12% to 15%) and medial third (5% to 8%).[1] Fractures of the clavicle have been traditionally treated non-operatively. Although many methods of closed reduction have been described, it is recognized that reduction is practically impossible to maintain and a certain amount of deformity and disability is expected in adults. Conservative treatment in the form of sling, figure of 8 bandage with sling, arm pouch etc. have been used for long time but poor outcomes like mal-union and non-union (15%) have been observed after conservative treatment of severely displaced clavicle fractures.[2]

In the past few years newer modalities of treatment have come up with early fixation of fracture with either an intra-medullary device or an extra-medullary plate. Intra-medullary fixation have progressed from Knowles pin-4,

Steinman pin -5, Rush pin -6, K wires -8, modified tension band -9, cortical screw -10. Extra-medullary fixation with suture button 11 or plates and screws like locking compression plate for distal end clavicle, hook plate, dynamic compression plate and reconstruction plate are used to get rigid fixation. There is still doubt in minds of many surgeons regarding treatment of clavicle fractures whether to operate or to treat conservatively in an adult patient.

In this study, we would like to analyze the outcomes of the operative management using plate and screw technique to fix clavicle fractures and compare its results with older modality of conservative treatment considering it as standard treatment option. We would also like to gain good experience with the surgical management of fresh lateral end of clavicle fractures with open reduction and internal fixation with plate and screws (hook plate, recon plate, DCP, lateral end clavicle plate).

METHODS

Study design and sample population

The present study was carried out at the Department of Orthopedics, DY Patil Medical College and Hospital, Navi Mumbai from June 2014 till October 2016. We included patients above 18 years who had lateral end clavicle fracture were included in this study after taking written informed consent from them. Open fractures, fractures associated with complication like head injury with associated other bone injuries were included in this study. We excluded patients less than 18 years of age, patients with middle third fracture of clavicle and patients with medial end clavicle fracture.

Data collection and data analysis

General information like name, age, sex, occupation and address were noted. Then a detailed history was elicited regarding mode of injury like fall on the shoulder, road traffic accident, direct injury to shoulder and fall on outstretched hand. Enquiry was made to note site of pain and swelling over the affected clavicle. Past medical history and family history was also recorded. Patients for surgery were selected as per indications for surgery and patient's consent. General condition of the patients was examined that is for pallor, pulse rate and blood pressure. Respiratory and cardio vascular system were examined for any abnormalities.

Plain radiograph of clavicle with shoulder in anteroposterior view was taken to assess the site of fracture and the fracture type (displacement and comminution). The fractures were classified according to Robinson's classification.[3] Patient to be treated operatively were investigated in form of routine investigation like Hb%, total count, differential count, ESR, blood urea, blood sugar, serum creatinine and ECG , chest X-ray were done. HBs Ag and HIV test were done before surgery of all the patients. All patients were operated as early as possible once the general condition of the patients were stable and the patients were fit for surgery as assessed by the physician. Patients were followed up every week for 4 weeks then at 8 weeks, 12 weeks, 6 months and 1 year. Local examination of the affected clavicle for tenderness, instability deformity and shoulder movements were assessed. X-rays were taken at each follow up visits to known about progressive fracture union and implant position. Rehabilitation of the affected extremity were done according to the stage of fracture union and time duration from day of surgery. Patients were followed up till radiological union. The functional outcomes were assessed by Constant and Murley score.[4] The data was analysed using SPSS. Statistical analysis was done by using proportions, percentages and chi-square test to check the association or independence. For various demographic variables like age, gender, mechanism of injury and associated injuries descriptive statistics was performed. To compare conservative and operative management, we used chi square test. P value less than 0.05 was taken to be statistically significant.

RESULTS

We included 48 patients in the study, 34 of which were males. Average age of the patients was 37.53±7.64 years. 23 injuries were on the left (Table 1).

Table 1: Baseline characteristics of patients enrolled in the study.

Variables	N (%)
Males	34
Age distribution	
< 20 years	0 (0)
20-29 years	12 (25)
30-39 years	14 (29)
40-49 years	10 (21)
50-59 years	4 (8)
> 60 years	8 (17)
Left sided fractures	23 (48)
Mechanism of injury	
Outstretched hand	3 (6)
Road traffic accident	45 (93)
Associated injury	
Distal end radius fracture	7 (14)
Proximal tibia fracture	7 (14)
Scapula fracture	13 (27)
Skull fracture	13 (27)
Superior & inferior pubic rami fracture	8 (17)

Road traffic accident was the most common mode of injury in our patient population. Scapula and skull fracture were the most commonly seen associated injuries in our patients. Other associated injuries were distal end radial fractures, proximal tibial fractures and superior and inferior pubic rami fractures. After regular follow up of

the patients, union time was less than or equal to 8 weeks in 22 out of 25 patients who underwent operative management and 13 out of 23 patients who underwent conservative management (Table 2). There was statistically significant better union times with operative management (p=0.034). Various complications were observed like infection, implant failure, man union, non-union, deformity and skin infections, statistically seen more in patients who underwent conservative management. Overall, patients experienced excellent and good results with operative management in 6 and 12 patients respectively.

Table 2: Comparing operative and conservative management of patients.

Variable	Operative management (n =25)	Conservative management (n =23)	P value
Union time	**n (%)**	**n (%)**	
Less than equal 8 weeks	22 (88)	13 (56)	0.034
More than 8 weeks	3 (12)	10 (43)	
Complications			
Infection	1 (4)	0 (0)	0.022
Implant failure	1 (4)	0 (0)	
Malunion	0 (0)	10 (43)	
Non union	0 (0)	1 (4)	
Deformity	0 (0)	8 (34)	
Skin infections	1 (4)	0 (0)	
Overall functional assessment using Constant and Murley score			
Excellent	6 (24)	3 (13)	0.61
Good	12 (48)	7 (30)	
Satisfactory	5 (20)	5 (21)	
Adequate	0 (0)	2 (8)	
Poor	2 (8)	6 (26)	

DISCUSSION

Clavicle fractures for long have been treated with conservative means in form of sling in which there was union but with some deformity in displaced fractures. As the interest in operative treatment has increased it has progressed from open reduction and fixation to closed reduction and fixation. Extra-medullary fixation have been performed from LCP distal end clavicle plate, locking hook plate, locking radius plate. But still operative treatment has not replaced conservative treatment and most of clavicle fractures are usually treated conservatively.[5] In a study conducted to analyze the results of conservative treatment by Hill et al, Nordqvist et al and Robinson et al found poor results following conservative treatment of displaced clavicle fracture.[2,6,7]

In our study all 16 operated patients united with an average union time of 7.8 weeks; 1 patient had delayed union by 12 weeks. 16 patients in conservative group united with 1 patient going into non-union. Average union time in conservative group was 9.4 weeks. Malunion was present in 41.1% of conserved patient. In the study by Pratik shah et al out of conservative group 3 patients went into non-union and 1 patient from the group treated with hook plate and 1 with TBW went into non-union.[8] Average union time for patients was 10.75 weeks. In our study 21 patients were treated operatively and 29 by conservative means. Functional out come in these patients was excellent in 9 (18.8%), good in 19 (39.6%), satisfactory in 10 (20.8%), adequate in 2 (4.2%) and poor in 8 (16.7%). Of these excellent 5 (10.4%) were in conservative group and 4 (8.3%) in operative group. Of good 11 (22.9%) were in conservative and 8 (16.7%) in operative. Of satisfactory outcome 5 (10.4%) were in conservative and 5 (10.4%) in operative and adequate 6 (12.5) in conservative and 2 (4.2) in operative statistical significance was proven between modality of treatment and functional outcome (p=0.61). In study by Pratik shah et al Constant–Murley score 50 of 28 (80%) of cases had excellent outcome, 6 (17%) of cases had good to satisfactory, none (3%) case had adequate and no case had poor outcome. [8] Mean Constant–Murley score was 94.5. In all cases with union treated with non-operative treatment only had mean Constant score 95 and non-union treated with non-operative treatment only had mean Constant score 78.

In our study, union time was earlier in operative group compared to operative group also functional outcome is better in operative group compared to conservative which is comparable to studies by Pratik shah et al. Also functional outcome was better for displaced fracture clavicle in operative group compared to those managed conservatively. Surgical treatment of these fractures is more appropriate than nonsurgical management to prevent non-union and functional disability in form of reduced range of motion, cosmetic deformity with locked plating being the most preferable implant and superior in term of all aspects.

CONCLUSION

In this study primary open reduction and internal fixation with plate and screws of fresh lateral end clavicle fractures provides a more rigid fixation and does not require immobilization for longer periods. Operative treatment gave statistically significant functional outcome and early healing compared to conservatively treated in displaced, communited lateral end clavicle fractures.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Craig EV, Basamania CJ, Rockwood CA. Fractures of the clavicle. In: Rockwood CA, Matsen FA, Wirth MA, Lippitt SB, editors. The shoulder. 3rd edition. Philadelphia: Saunders; 2004: 455- 519.
2. Hill JM, McGuire MH, Crosby LA. Closed treatment of displaced middle third fractures of the clavicle gives poor results. J Bone Joint Surgery. 1997;79:537-40.
3. Lazarus MD. Fractures of the Clavicle. Chapter 26, In: Bucholz RW, Heckman JD, editors. Rockwood and Green's fractures in adults. 5th edition. Philadelphia: Lippincott Williams and Wilkins; 2001: 1041-1078.
4. Constant CR, Murley AHG. A clinical method of functional assessment of the shoulder. Clin Orthop Rel Res. 1987;214:160-4.
5. Canadian Orthopaedic Trauma Society. Nonoperative treatment compared with plate fixation of displaced midshaft clavicular fractures. A multicenter, randomized clinical trial. J Bone Joint Surg Am. 2007;89:1.
6. Nordqvist A, Petersson C, Redlund-Johnell I. The natural course of lateral clavicle fracture. 15 (11-21) year follow-up of 110 cases. Acta Orthop Scand. 1993;64(1):87-91
7. Robinson CM, Court Brown CM, McQueen MM, Walkefield AE. Estimating the risk of non union following non operative treatment of a clavicular fracture. J Bone Joint Surgery 2004;86:1359-65.
8. Shah PD, Patel BN, Soman SM. Treatment of Neer's Type 2 Distal End Clavicle Fracture: A Systemic Review of Treatment Modalities in 35 Fractures. Int J Sci Res. 2014;3(8):315-6.

Cite this article as: Kale SY, Chaudhari P, Singh SD, Dhar SB, Samant PD, Tayade A. Comparing functional outcome in lateral end clavicle fracture after conservative and plating. Int J Res Orthop 2017;3:833-6.