ISSN: 0975-1556

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2022; 14(1);516-523

Original Research Article

Functional Outcome of Conservative Management of Displaced Midshaft Clavicle Fracture: It's Significance During Covid- 19 Pandemic

Kanchana Laishram[1], L. Labango Singh[2], Ruma Sarkar[3], H. Shantikumar Singh[4]

[1]Post Graduate Trainee, Department of Orthopaedics, Jawaharlal Nehru Institute of Medical Sciences (JNIMS), Imphal, Manipur, India

[2]Assistant Professor, Department of Orthopaedics, Jawaharlal Nehru Institute of Medical Sciences (JNIMS), Imphal, Manipur, India

[3]Associate Professor, Department of Radiodiagnosis, Jawaharlal Nehru Institute of Medical Sciences (JNIMS), Imphal, Manipur, India

[4]Assistant Professor, Department of Orthopaedics, Jawaharlal Nehru Institute of Medical Sciences (JNIMS), Imphal, Manipur, India

Received: 01-11-2021 / Revised: 29-11-2021 / Accepted: 23-12-2021
Corresponding author: Dr. H. Shantikumar Singh
Conflict of interest: Nil

Abstract

Background: With increasing popularity of surgical interventions in the past few decades in the field of Orthopaedics, conservative treatment methods were challenged by surgical techniques of fracture fixation with various implants. However, due to the COVID-19 pandemic, the need for pragmatic management that balances optimum treatment of patients against clinically safe practice has brought conservative treatment methods back into focus.

Methods: The functional outcome of displaced mid-shaft clavicle fracture in 20 patients (6 females, 14 males) managed conservatively with figure of eight bandage was studied prospectively over a period of 9 months from March- November 2020. The demographic and the clinical data including the Constant Murley Score, length of shortening of the fractured clavicle, non-union and cosmetic outcome of the patients were recorded over 3 follow up visits at 2 weeks, 6 weeks and 3 months. The correlation between the study variables and the functional and clinical outcome was then calculated.

Results: The mean shortening of fractured clavicle was 15.65±2.94 mm and the mean Constant Murley Score was 76.90±3.27. On an average, the union was achieved at 3 months and there were no non-union cases. Out of the 20 patients, 18 patients were satisfied with the treatment and 2 were dissatisfied with the outcome. Dissatisfaction was more among the males as compared to the females. 2 out of14 males were not satisfied. There was no significant association between the satisfaction of treatment and shortening of the bone (P value >0.05). There was a linear correlation between the Constant Murley Score and bone shortening with the functional outcome being better with lesser bone shortening.

Conclusion: During the treatment of displaced mid shaft clavicle fractures in adults, the conservative management with figure of eight bandage yielded a good functional outcome with fewer follow-up visits to the hospital. The conservative treatment still had a significant place in the armamentarium of fracture management during the COVID 19 pandemic.

Keywords: Conservative treatment, clavicle, clavicle fracture, COVID 19

Introduction

Clavicle fractures account for 2.6-10% of all fractures[1]. About 80% of these occur in the middle 1/3rd (mid-shaft) of clavicle and over half of these are displaced fractures[2,3]. Midshaft clavicle fractures occur mostly in physically active population and it has a significantly negative functional impact. Clavicle injuries result from fall onto the shoulder (87%), direct blow (7%) and fall on an outstretched hand (6%)[4]. Younger adults often sustain these injuriesby moderate- to high-energy mechanisms such as road traffic accidents or sports injuries[5].

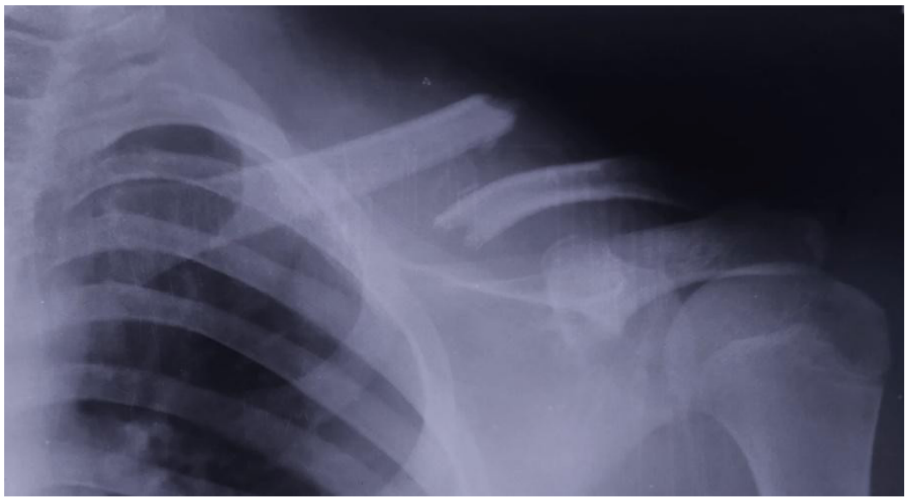

Figure 1(A): X-ray shows fracture of middle one third (mid shaft) of left clavicle with significant displacement and shortening following fall onto the left shoulder during a road traffic accident

Traditionally, clavicle fractures were treated non-operatively, even when substantially displaced. This was based on a study done by Neer in 1960 which showed a very low non- union rate of 0.13% in 2000 patients and Rowe's publication from 1968 with non-union rate of 0.8% in 566 mid-shaft clavicle fractures[6-10]. The non-operative treatment methods were challenged by the increasing popularity of the surgical methods of fixation with anatomical plates and intramedullary nailing, etc. With the advent of COVID19 pandemic, the British Orthopaedic Association (BOA) emergency COVID 19 Guidelines and the National Health Service England (NHSE) guidelines have focussed on the need to manage various orthopaedic conditions pragmatically balancing optimum treatment of patients against clinical safety with resource utilization[11,12]. After considering various guidelines and publications by various health authorities / associations for triaging patients for surgeries, the Indian Orthopaedic Association (IOA) has included clavicle fractures in the category for non-operative treatment[13]. This has resulted in revival of conservative methods in the treatment of displaced mid-shaft clavicle fractures. The aim of this study was to assess the functional outcome in relation to shortening of the bone and treatment satisfaction among patients with displaced mid-shaft clavicle fractures who were managed conservatively during the COVID19 pandemic.

(a) (b)

Figure 1(B): (a) X-ray shows progressive bony union with bridging callus (arrow) formation at 3 months follow up from day of injury (b) X-ray showing united fracture clavicle (arrow) following conservative treatment with figure of eight bandage

Methods

This was an analytical cross-sectional study conducted among patients with displaced mid- shaft clavicle fractures who were managed conservatively with figure-of-eight bandage who presented in casualty from March till November 2020. Inclusion criteria for the study were the patients of Age in the range of 18-60 years and were Fresh cases (within 1week of injury). They had displaced middle 1/3rd clavicle fracture. Exclusion criteria for the study were the patients having pathological fractures that is, non-union / malunion cases, neurovascular injuries, open fractures, bilateral clavicle fractures, presence of any pathology impairing the function of either of the shoulders, and any patient not giving consent. Twenty (20) patients (female 6, male 14) who met the inclusion and exclusion criteria and who gave the formal consent for participating in the study were selected. Their demographic profiles (age, sex), history including mode and mechanism of injury, time since injury, any associated history of previous shoulder pathologies and clinical data including side of injury (dominant/non dominant), standard AP view chest with bilateral shoulder radiographs, the Constant Murley Score, nonunion and a questionnaire for determining satisfaction of treatment outcome were recorded over four follow-up visits at 2 weeks, 6 weeks and 3 months. The Constant Murley Score was used to assess the pain, ability to carry out activities of daily living, range of movement and strength[14]. Figure of eight bandage was used.

Figure 2(a): Figure of eight bandage used to immobilised the fractured clavicle

A standard AP view x-ray chest with bilateral shoulders was used to classify the fracture and measure shortening of the bone. Robinson type 2B fractures were included[8]. After calculating the length of the healthy segment and the affected segment by drawing a straight line through the medial point of the sternal and acromial borders, the difference was expressed in mm, andthe percentage of shortening was quantified[19]

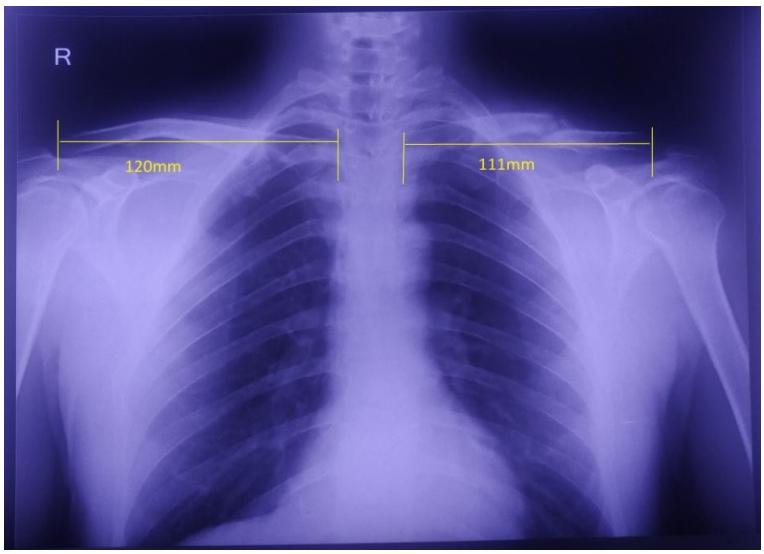

Figure 2(b): Length of shortening measured using AP view x- ray and percentage shortening calculated at last follow up visit. 9 mm shortening with 9.25% shortening is present here

Successful union of the fracture was determined by the formation of callus and the presence of a trabecular bridge over the fracture gap level within 6 months of the trauma[16]. A simple questionnaire was given to assess the final outcome including cosmetic and functional satisfaction at the end of the treatment. The data collected were analysed using SPSSv.22 software. P-value of <0.05 was considered as statistically significant. The quantitative variables were expressed as mean±standard deviation. The correlation between the functional outcome given by the Constant Murley Score and the length of bone shortening was analysed. The association between satisfaction of treatment outcome and length of bone shortening was calculated.

Results

The 33 patients included in the study were treated within 72 hours of injury. They were treated by figure of eight bandage for mean of 25.65±2.94 days. The patients then did passiverange of movement exercises for 2 weeks after removal of the bandage. The study sample had 6 females (30%) and 14 males (70%). 25% (n = 5/20) had injury in the dominant side and 75% (n = 15/20) had injury on the non-dominant side. Most common mechanism of injury was fall onto the shoulder. 16 out of 20 patients (80%) had history of RTA and remaining 4 out of 20 patients (20%) had history of fall from height. The mean shortening length was 15.65 ± 2.94 mm and the mean Constant Murley Score was 76.90±3.27. Overall, only 2 patients out of 20 (10%) were not satisfied with the treatment outcome and remaining 18 patients (90%) were satisfied with the treatment outcome. There was no non-union case in this study.

Table1: Proportion of satisfaction of treatment outcome according to the side involved and the gender

	Satisfied		Not Satisfied	
	n	%	n	%
Dominant side (Total= 5)	4	80%	1	20%
Non dominant side (Total=15)	14	93%	1	7%
Female (Total=6)	6	100%	0	0%
Male (Total = 14)	12	86%	2	14%

On the average, treatment was completed within only 3 hospital visits by 3 months from dateof injury. Dissatisfaction with the treatment outcome was more among males as compared to females. There was no significant association between the satisfaction with treatment outcome and shortening of the bone (p value > 0.05).

Table 2: Mean shortening values expressed in mm and percentage variation in satisfied and not satisfied patients

Shortening	Satisfied mean ± SD	Not satisfied mean ± SD	t-value	P- value
Mm	15.50 ± 3.05	17 ± 1.41	-0.69	0.50
%	9.91 ± 2.61	11 ± 1.41	-0.56	0.57

R2 = 0.70; p = < 0.05

After performing logistic regression analysis, the clavicle shortening was found to be associated with the Constant Murley Score and was found to be statistically significant. The Pearson correlation coefficient was -0.83 and P value was <0.05. There was a linear correlation between the Constant Murley Score and bone shortening with the functional outcome being better with lesser bone shortening.

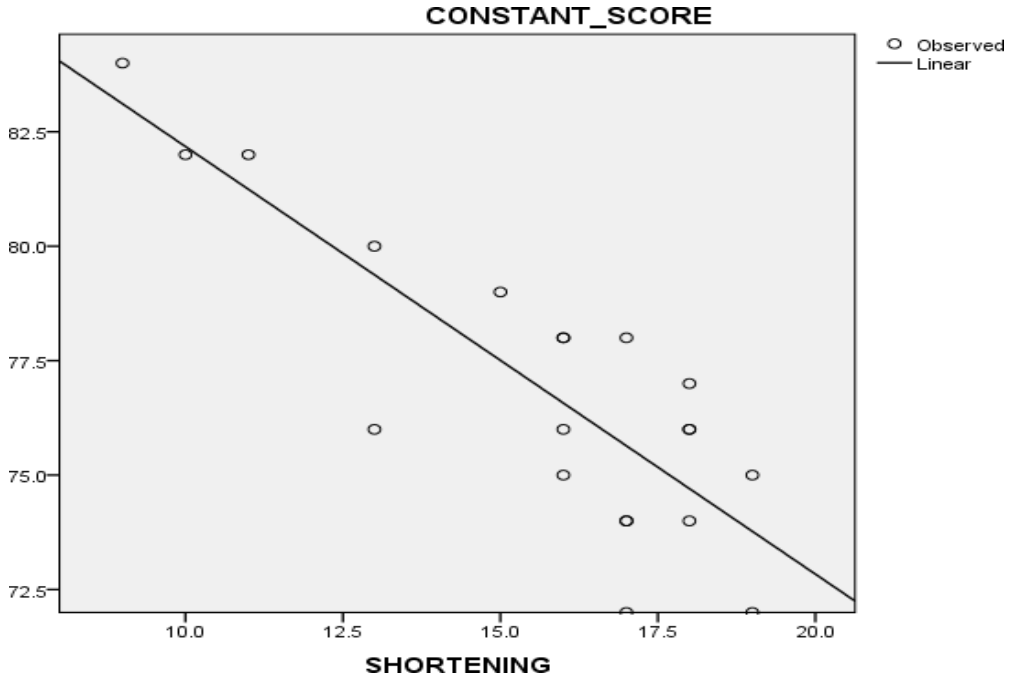

Figure 3: Scatter plot showing a linear correlation between clavicle shortening (mm) and the Constant Murley Score

Discussion

The aim of this study was to assess the functional outcome in relation to the shortening of the bone and treatment satisfaction among patients with displaced mid-shaft clavicle fractures who were managed conservatively during the COVID 19 pandemic. Conservative treatment consists of the application of a figure-of-eight bandage to restore the retro-positioning of the shoulder, resolving the superimposition of the stumps and limiting clavicle shortening. The correlation between clavicle shortening and the functional outcome measured by the Constant Murley Score was found to be significant, with better outcome observed with lesser shortening. The dissatisfaction with the treatment was relatively more in males whose occupation was physically demanding.

(a) **(b)**

Figure 4: (a) Restriction of shoulder abduction on the day of injury. (b) Shoulder abduction at 3months following conservative treatment with figure of eight bandage

According to the literature, the incidence of failure of conservative treatment of clavicle fractures ranges from 4.4% to 31% in terms of pain, loss of force, rapid fatigue, paraesthesia, pain when lying on the affected shoulder and aesthetic defects[17-19]. In this study, only 2 patients (10%) complained about loss of force and aesthetic defects. In a prospective observational cohort study, Robinson et al. (2004) described a consecutive series of 868 patients with clavicular fractures, 581 of whom had a mid-shaft diaphyseal fracture. They found a significantly higher non-union rate (21%) for the displaced, comminuted mid-shaft fractures ($p < 0.05$) when treated non operatively[20]. In 2007, the Canadian Orthopaedic Trauma society published the first randomized controlled trial (RCT) comparing non- operative treatment with plate fixation, showing lower non-union rates and a better arm function after plate fixation[6]. Although several other RCTs have been published since then, the issue remains unresolved because the question of whether operative treatment is most suitable for all patients with a displaced mid-shaft clavicular fracture remains unsettled. In this study there were no non-union cases. The overall outcome of conservative treatment in this cohort study had a favourable outcome with good function. In the current scenario of COVID 19 pandemic, the aim should be to minimise the risk of viral transmission by avoiding Aerosol Generating Procedures

(AGP) and appropriate use of Personal Protective Equipments while providing optimum treatment to the patients[21]. In this study the use of Conservative treatment method had resulted in fewer follow-up visits to the hospital with good treatment outcome. Limitations of this study include a relatively small sample size and no control group consisting of patients who were managed surgically.

Conclusion

The conservative treatment methods serve as a means to successfully treat various orthopaedic injuries which would have been otherwise managed surgically. The COVID 19 pandemic has revived the forgotten art of conservative management of fractures and has shown that it still has a significant place in the armamentarium of fracture management.

References

1. O'Neill BJ, Hirpara KM, O'Briain D, McGarr C, Kaar TK.Clavicle fractures: A comparison of five classification systems and their relationship to treatment outcomes. Int Orthop 2011; 35:909-14.
2. Postacchini F, Gumina S, De Santis P, Albo F. Epidemiology of clavicle fractures. J Shoulder Elbow Surg 2002; 11:452-6.
3. Nordqvist A, Petersson C. The incidence of fractures of the clavicle. Clin Orthop Relat Res 1994; 300:127-32.
4. Stanley D, Norris SH. Recovery following fractures of the clavicle treated conservatively. Injury.1988;19(3):162–4.
5. Browner BD, Jupiter JB. Skeletal Trauma. 3rd ed. Philadelphia, PA: WB Saunders; 2003.
6. 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. 2007Jan;89(1):1-10.
7. Ljunggren AE. Clavicular function. Acta Orthop Scand. 1979;50(3): 261–8.
8. Robinson CM (1998) Fractures of the clavicle in the adult. Epidemiology and classification. J Bone Joint Surg Br 80(3):476–84.
9. Neer CS 2nd. Nonunion of the clavicle. JAMA.1960;172:1006-11. 10. Rowe CR. An atlas of anatomy and treatment of midclavicular fractures. Clin Orthop Relat Res.1968; 58:29-42.
10. Rowe CR. An atlas of anatomy and treatment of midclavicular fractures. Clin Orthop Relat Res.1968; 58:29-42.
11. British Orthopaedic Association. Management of Patients with Urgent Orthopaedic Conditions and Traumaduring the Coronavirus Pandemic; 2020.
12. NHS England and NHS Improvement Coronavirus. Specialty Guides-Major Trauma; 2020.
13. Indian Orthopaedic Association's Updated Advisory (8th June) during CoVid 19:2020.
14. Constant CR, Murley AH: A clinical method of functional assessment of the shoulder. Clin Orthop 1987, 214:160-4.
15. Preston CF, Egol KA: Midshaft clavicle fractures in adults. Bull NYU Hosp Jt Dis 2009, 67(1):52-7.
16. Jubel A, Andemahr J, Bergmann H, Prokop A, Rehm KE: Elastic stable intramedullary nailing of midclavicular fractures in athletes. Br J Sports Med 2003, 37:480-3.
17. Nowak J, Holgersson M, Larsson S: Sequelae from clavicular fractures are common: a prospective study of 222 patients. Acta Orthop 2005, 76(4):496-502.
18. Inman VT, Saunders JB: Observations on the function of the clavicle. Calif Med 1946, 65(4):158-66.
19. Lazarides S, Zafiropoulos G: Conservative treatment of fractures at the middle third of the clavicle: the relevance of shortening and clinical outcome. J Shoulder Elbow Surg 2006, 15(2):191-4.

20. Robinson CM, Court-Brown CM, McQueen MM, Wakefield AE. Estimating the risk of nonunion following nonoperative treatment of a clavicular fracture. J Bone Joint Surg Am.2004; 86:1359-65.
21. De Giorgi et al.: Conservative treatment of fractures of the clavicle. BMC Research Notes 2011 4:333.