DOI: https://doi.org/10.53350/pjmhs2023172384

ORIGINAL ARTICLE

Comparative Study of Operative and Non-Operatively Treated Displaced Mid-Shaft Clavicle Fractures in Adults

RAJA ADNAN ASHRAF[1], MUHAMMAD MUNEER HAIDER[2], FAIZAN RAUF[3], HASSAN IQBAL[4], RIZWAN ANWAR[5]
[1]*Assistant Professor Orthopaedic, Pakistan Railway General Hospital, Rawalpindi*
[2]*MBBS, FCPS, Orthopedics, Senior Registrar, DHQ Teaching Hospital, Sargodha*
[3]*MBBS, FCPS, Orthopedics, Senior Registrar, HITEC Institute of Medical Science, Taxila*
[4]*Postgraduate Resident, National Hospital and Medical Center, Lahore*
[5]*Assistant Professor, Department of Orthopaedic Surgery, Islam Teaching Hospital Sialkot*
Corresponding author: Raja Adnan Ashraf, Email: dr.addi79@yahoo.com

ABSTRACT

Background: A displaced mid-shaft clavicle fracture in an adult is a break in the collarbone, which is the long bone that runs from the shoulder to the chest. Mid-shaft fractures occur in the middle portion of the collarbone and the displaced fracture means that the broken pieces have moved out of their normal alignment.

Study design: It is a comparative study conducted at Orthopedics Department of Pakistan Railway General Hospital, Rawalpindi for the duration of six months from Jan 2022 to June 2022.

Material and Methods: The patients who were treated without operation were compared with operative patients for better results. Both groups contained 60 patients. The average age of the patients was 29.9±7.8 in the control group and 32.1±8.1 in the non-operative group. There were 32 and 28 patients in control group that had right and left side of injury respectively. This study was approved by the ethical and the review board committee of the hospital. The data was collected and statistical analysis was performed.

Results: The functional outcome of the patients is constant score fracture was calculated and clavicle shortening was carefully observed. The average shortening of clavicle was 0.71±8.1 cm. After a follow-up of 3 months' clavicle shortening was calculated. The outcome was linked to amount of clavicle shortening among patients

Conclusion: The study was done to find the functional outcome of non-operatively treated displaced mid-shaft clavicle fractures in the adult as compared with the operatively treated patients. The results showed that non-operative management of minimally displaced mid shaft clavicle fracture also had good functional outcome.

Keywords: Clavicle fracture and the non-operative treatment.

INTRODUCTION

A displaced mid-shaft clavicle fracture in an adult is a break in the collarbone, which is the long bone that runs from the shoulder to the chest. Mid-shaft fractures occur in the middle portion of the collarbone and the displaced fracture means that the broken pieces have moved out of their normal alignment[1-2]. Clavicle fracture is the most ordinary injuries around the shoulder girdle. Approximately 2.6% of all the fracture are clavicle fractures. The most frequently fracture occurs in middle third of the shaft which accounts 80-85%, then by the distal third which accounts 15-20%and the other one is the fracture in medial third, it is rarely occurs and accounts about 0-5%[3-4]. Displaced mid-shaft clavicle fractures can characterized by the pain, disability and decreased quality of life. These fractures can be treated by both the non-operative and operative methods. Many of the clavicle fractures treated unexceptionally without any serious problem with the non-operative treatment. Non-operative treatment has the outcomes of being easy, inexpensive and minimally invasive. The non-operative treatment include immobilizing the affected arm with a sling to provide support and restrict movement[5-6.] However, the functional outcome of non-operatively treated clavicle fractures has been a subject of controversy, with some studies suggesting good results and other indicating poor outcomes. The functional outcome of non-operatively treated clavicle fractures can be affected by several factors, including the age of the patient, type of injury, and patient-reported outcomes. In general, younger patients tend to have better functional outcomes than older patients, as they have more reserves to compensate for the injury and may be more willing to undergo physical therapy[7-8]. Similarly, fractures resulting from low-energy trauma tend to have better outcomes compared to fractures resulting from high-energy trauma. Patient-reported outcomes, such as pain, function, and satisfaction, are important indicators of the success of non-operative treatment. These outcomes can be measured using various tools such as Constant-Murley score, dysfunction of the arm and the short-form health survey. These tools can provide valuable insights into the long-term effects of non-operative treatment on patients' daily activities, work performance, and overall quality of life[9]. Non-operative treatment can be an effective option for displaced mid-shaft clavicle fractures in adult patients, but functional outcome can be affected by several factors. Although procedural involvement is being used more often than ever before, non-operative management continues to play an important role in these cases[10]. Additional research is needed to superior comprehend the long-lasting effects of this approach of the treatment and to develop strategies to optimize functional outcomes for patients with displaced clavicle fractures.

MATERIAL AND METHODS

The patients who were treated without operation were compared with operative patients for better results. Both groups contained 60 patients. The average age of the patients was 29.9±7.8 in the control group and 32.1±8.1 in the non-operative group. There were 32 and 28 patients in control group that had right and left side of injury respectively. The data was collected and statistical analysis was performed. The study was followed up over the time period of the three months. According to the inclusion criteria following patients were selected for the study:

- The patients with the age between 20 to 50 years
- The patients diagnosed with displaced clavicle fracture

According to the exclusion criteria following patients were selected for the study:

- The patients with compound fracture
- The patients with floating shoulder
- The patients with neurovascular injury
- The patients with skin tenting

A detailed history was recorded, including age, gender, and side of involvement. A physical exam was performed to rule out skin tenting, an open wound, and distal neurovascular status. At the time of enrollment, the amount of clavicular shortening was measured and tracked in centimetres. Clavicle braces and arm pouches were used to manage the cases. SPSS was used to enter and analyse the data. Continuous data are presented as mean and standard deviation, while discrete data are presented as frequency and percentages. To compare means between groups, the ANOVA test was used.

RESULTS

The study was carried out to compare the functional outcome of Non-Operatively Treated Displaced Mid-Shaft Clavicle Fractures in Adult with operatively treated patients. Similarly, in non-operative group there were 30 patents with right and 30 patients with left side of injury. Most of the patients reported about RTA to be the mechanism of their injury. However, there were 18 patients in the non-operative group that reported about sports injury.

Table 1: General features of control group and non-operative group

Features	Control group (operative patients) (60)	Non-operative group (60)	P value
Sex (Male/female)	52/8	50/10	
Average age (years)	29.9±7.8	32.1±8.1	0.00
Side of injury (right/left)	32/28	30/30	Ns
Reason of injury			
Sports injury	20	18	0.005
RTA	28	28	0.05
Fall from height	12	14	0.001

The functional outcome of the patients is shown in table no.2. Constant score fracture was calculated and clavicle shortening was carefully observed in both groups. The average shortening of clavicle was 0.71±8.1 cm. After a follow-up of 3 months' clavicle shortening was calculated. The outcome was linked to amount of clavicle shortening among patients

Table 2: Clavicle shortening and Functional outcome of patients with treated mid shaft clavicle

Constant score after 3 months	Non-Operative group (n=60) Clavicle shortening		Operative group (n=60) Clavicle shortening		P value
	Average (cm)	SD	Average (cm)	SD	
Excellent	0.052	0.29	0.090	0.23	ns
Good	0.89	0.56	0.92	0.42	0.012
Fair	1.35	0.22	1.30	0.34	0.005

The complication rate was also assessed and it was found that in the non-operative group the patients had almost few cases of complication observed. However, in case of operative group the patient's complaint about muscle wasting (n=16), Complete regional pain syndrome (n=4) and droopy shoulder (n=4) hardware irritation (n= 2) as shown in table no.3.

Table 3: Complication rate among patients

Complications	Non-operative group (n=60)	Operative group (n=60)	P value
Muscle wasting	5	16	0.005
Hardware irritation	0	2	0.005
Complete regional pain syndrome	0	4	0.05
Droopy shoulder	2	4	ns

DISCUSSION

There is a lot of ambiguity right now about the use of surgery to treat middle third clavicle fracture as it can be treated without operation as well among adults. In the previous studies there are present no quantitative data whether there should be a surgical operation to treat this fracture[11]. This study was done to find the functional outcomes of functional outcome of non-operatively treated displaced mid-shaft clavicle fractures in Adult. The study was done in form of two groups. Control group consisted of patients who were treated by performing surgery on their third clavicle fracture. Control group and non-operative group contained 60 patients each. The patients who were following the inclusion criteria were included all other patients were excluded from the study. The mean age of patients ranged from 29.9±7.8 in the control group and 32.1±8.1 in the non-operative group. In a previous study there were patients mostly in the age of 30s that were used for this study. However, as per previous studies it was reported that age distribution was studied and younger individuals suffer from the disease more than the adults[12-13]. Our study reported that there were 52 males and 8 females in the control group and 50 males and 10 females in the non-operative group. In our study there was no case of complete regional pain syndrome found in the control group as compared to the non-operative group where 4 patients suffered. Previously it was found that 68% male had such fractures and are mostly admitted to the hospitals more frequently as compared to females[14]. Another study showed male patients with 70% ratio and only 30% female with mid-shaft clavicle fractures[15]. In our study it was found that most common cause of injury was sports injury as found in 20 and 18 patients in control and non-operative group respectively. However, previous studies show the road accidents as the main cause of injury as found in 70% of the cases[16]. Another study showed bicycle accidents as one of the main causes of mid-shaft clavicle fractures[17-18]. The constant score in our study varies with the passage of time as after 3 months' follow-up it was found that the constant score in our study was between 60-100. In the previous studies the constant score was from 40 to 90. The high mean constant score was because of clavicle shortening of less than 1.5cm. It was found that if there is increased extent of clavicle shortening it can cause clear difference in the resting of scapula position with a lesser tilt leading to increased lateral rotation. As a result, there is great amount of scapulothoracic and glenoid alignment. Studies have shown that malposition of scapula has significant link with shortening. There occurs a major change in the position and orientation of scapula, after shortening. Which is present at the time of full abduction and the leaning motion[19-20]. Therefore, there is an inverse relation between shoulder functional outcome and extent of shortening. In this study it was found that the patients that had clavicle shortening of >1.5 cm reported about dysfunctional shoulder movement after 3 months. The complication rate was also assessed and it was found that in the non-operative group the patients had almost no case of complication observed. However, in case of operative group the patient's complaint about muscle wasting (n=16), Complete regional pain syndrome (n=4) and droopy shoulder (n=4), hardware irritation (n= 2) as shown in table no.3. In our studies it was evident that the patients that went through surgery for the treatment of mid-shaft clavicle fracture suffered from more complications as compared to the non-operative patients. However, the non-operative patients did not report about any serious complication and were discharged from the hospital shortly. Similar findings were found in the previous studies as well where no complications were seen in the non-operative group[21].The study was done by taking patients from a single hospital. If patient's data was collected from more than one health care center, then results would be more refined and detailed. Our findings are in accordance with the previous studies where there was a clear effect of 15 mm of shortening on the constant score after 6 months. In our studies it was also found that patients were not satisfied if the shortening of clavicle is done up to 15.2mm.

CONCLUSION

The study was done to compare the functional outcome of non-operatively treated displaced mid-shaft clavicle fractures with operatively treated patients in adult. The results showed that non-operative management of minimally displaced mid shaft clavicle fracture also had good functional outcome. The extent of clavicle shortening had direct link with the functional outcomes. However, there is need for a large scale study to verify the results further.

REFERENCES

1. Uprety S. Functional Outcome of Non-Operatively Treated Displaced Mid-shaft Clavicle Fractures in Adult. Nepal Orthopaedic Association Journal. 2021;7(2).
2. Patel MM, Patel JJ, Gupta AK, Shah SS, Shethna S. Comparative evaluation of operative versus non-operative management of midshaft displaced clavicle fractures: A case series. Int J Orthop Sci. 2017;3(32):594-9.

3. Haque MM, Ahmed M, Hossain MZ, Faisal MA, Islam MS, Haque SS, Tarik MM, Russel M. Operative versus Conservative Treatment for the Management of Displaced Midshaft Clavicle Fractures in Adults. Journal of Armed Forces Medical College, Bangladesh. 2017 Apr 21;13(1):81-5.
4. Jain D, Vieira A, Mahajan A, Naik A, Kotecha H, Issrani M. Does operative management provide better outcome in displaced mid-shaft clavicle fractures? A randomized control study. Journal of Orthopaedic Diseases and Traumatology. 2022 Jan 1;5(1):41.
5. Karmakar A, Ghosh A. Comparison between conservative and surgical management of displaced mid-shaft clavicle fractures in adults. International Journal of Orthopaedics. 2021;7(3):873-9.
6. Das CK, Hossain MI, Rahman A, Siddiqui FA. Outcome of Operative Treatment of Displaced Midshaft Clavicle Fracture Compared With Conservative Treatment. Journal of Chittagong Medical College Teachers' Association. 2019 Aug 26;30(1):21-6.
7. Kassim S, Rai M, Hegde RM, Kishore SG, Shetty S, Balakrishna PN. The study of the functional outcome between surgical & conservatively treated clavicular fractures. International Journal of Orthopaedics. 2020;6(1):1205-9.
8. Saragaglia D, Refaie R. Displaced mid-shaft clavicular fractures: state of the art for athletes and young active people. International Orthopaedics. 2021 Oct;45:2679-86.
9. Nagar ST, Pimpri P. A comparative study of outcome of displaced mid shaft clavicle fracture managed by operative versus conservative treatment. International Journal of Orthopaedics. 2018;4(3):127-9.
10. Kumar BV. Operative treatment of clavicle midshaft fractures by locking plate. International Journal of Orthopaedics. 2019;5(3):01-3.
11. Rehn CH, Kirkegaard M, Viberg B, Larsen MS. Operative versus nonoperative treatment of displaced midshaft clavicle fractures in adults: a systematic review. European Journal of Orthopaedic Surgery & Traumatology. 2014 Oct;24:1047-53.
12. Kumar A, Gulat DS. Conservative versus operative treatment of displaced mid shaft clavicle fracture-a two years randomized controlled study. J Evid Based Med Healthc. 2018;5(22):4.
13. AL-OLEMY AH, ROMEIH M, QUOLQELA M. Nonoperative Treatment Compared with Plate Fixation of Displaced Midshaft Clavicular Fractures in Adults. The Medical Journal of Cairo University. 2019 Jun 10;87(June):1741-51.
14. Mishra S, Panda D. Conservative management versus surgical management: A comparative study on displaced midshaft clavicular fractures in adults. International Journal of Orthopaedics Sciences. 2020;6(1):1171-5.
15. Jha GK, Timsina P, Yadav D, Lamichhane S, Jha S. Conservative vs operative management of displaced midshaft clavicle fracture: a comparative study. Biomedical Journal of Scientific & Technical Research. 2018;11(1):8293-303.
16. Ban I, Branner U, Holck K, Krasheninnikoff M, Troelsen A. Clavicle fractures may be conservatively treated with acceptable results-a systematic review. Dan Med J. 2012 Jul 1;59(7):A4457.
17. Sherif MM, Mohamed OA, Hassan MA. Clinical Outcomes of Plate Fixation Compared with Non-operative Treatment of Displaced Mid-shaft Clavicular Fractures in Adults. International Journal of Medical Arts. 2021 Apr 1;3(2):1351-8.
18. Simon P. Mid-clavicle fractures in adults: surgery or not?. European Journal of Orthopaedic Surgery & Traumatology. 2010 Oct;20(7):521-5.
19. Driss O, Touondounko MP, Baba HF, Senhaji S, Abid H, El Idrissi M, El Ibrahimi A, El Mrini A. Outcomes of Surgical Treatment of Midshaft Clavicle Fracture (About 66 cases). Orthopedics Research Journal. 2020 Nov 27;4(1):1-4.
20. Shetty SK, Chandran R, Ballal A, Mathias LJ, Hegde A, Shetty A. To operate or not to operate the mid-shaft fractures of the clavicle: a comparative study of functional outcomes of the two methods of management. Journal of clinical and diagnostic research: JCDR. 2017 Jan;11(1):RC01.
21. Singh V, Marotia AK, Gundavarapu A, Sharma A. A Prospective Observational Study on Outcomes of Displaced Mid-Shaft Clavicle Fractures Treated with Locking Compression Plate at a Tertiary Center in Jaipur. J Evid Based Med Healthc. 2021;8(30):2679-84.