E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/15.1.238

Research Article

Patient Satisfaction In Relation To Duration of Conservative Management in Midshaft Clavicle Fractures

Dr.Nasir Hussain[1], Dr.Wali Khan[2*], Dr.Raheel Aslam[3], Dr. Farukh Hussain[4], Dr. Muhammad Annam Farooq[5], Dr. Kishwar Jehandad[6 (PT)]

[1]Post Graduate Trainee, Department of Orthopedics, Jinnah Post graduate medical college, Karachi, Pakistan.
[2*]Post Graduate Trainee, Department of Orthopedics, Jinnah Post graduate medical college, Karachi, Pakistan.
[3]Senior Registrar, Department of Orthopedics, Jinnah Post graduate medical college, Karachi, Pakistan.
[4]Assistant Professor, Department of Orthopedics, Jinnah Post graduate medical college, Karachi, Pakistan.
[5]Assistant Professor, Department of Orthopedics, Jinnah Post graduate medical college, Karachi, Pakistan.
[6]Lecturer, Department of Nursing, Al-Jadoon School of Nursing and health sciences, Karachi, Pakistan.
Email: [1]nasirsoomro83@gmail.com, [2*]walikhan2223330@gmail.com,
[3]devoted786@gmail.com, [4] Farukh_dr@gmail.com, [5]annam_smc@live.com,
[6]kishwarjehandad@gmail.com
Correspondence Author: Dr. Wali Khan[2]

Received: 03.05.25, Revised: 19.05.25, Accepted: 13.06.25

ABSTRACT

Background: The clavicle, an S-shaped bone, serves as a strut between the sternum and the glenohumeral joint. It also plays a crucial role in suspending the shoulder girdle, with the shoulder hanging from it via the coracoclavicular ligament. The annual incidence of mid-clavicular fractures is approximately 64 per 100,000 individuals. Among clavicle fractures, midshaft fractures are the most common, accounting for 70% to 80% of cases, while lateral fractures make up 15% to 30%, and medial fractures are the rarest, comprising only about 3%. Open clavicular fractures are uncommon, occurring in just 0.1% to 1% of cases. Different strength assessment methods have been used, such as a spring balance to measure force at 90° abduction, with a maximum recorded strength of 25 lb (11.3 kg), and the Nicholas manual muscle tester. However, these techniques may lack the precision needed to detect subtle changes in endurance strength.

Objective: The objective of this study is to determine the number of satisfied patients undergoing non-surgical correction for mid-shaft clavicular fractures.

Methods: This cross-sectional prospective study was conducted from December-2024 to April 2025 among Patients Treated Conservatively for Midshaft Clavicle Fractures presenting to tertiary care hospital, department of orthopedic surgery. After getting ethical approval from Jinnah Post Graduate Medical Center (Ref# F.2-81/2024-GENL/125/JPMC). Data was collected by principle investigator. Pre-designed written (DASH) questionnaire was used. The first section included Age, Gender questions on demographic characteristics of study participants and the second section of the questionnaire included the Disabilities of the Arms, Shoulder and Hands (DASH Score) and association between Duration of Conservative Treatment and Patient Satisfaction in Midshaft Clavicle Fracture Patients. Calculated sample size was 80 patients. Data was entered in SPSS version 23. This study was carried out at JPMC's Department of Orthopedics Surgery in Karachi. Patients were counselled on non-surgical options, and informed consent was acquired. A figure-of-eight bandage or clavicular brace was used for six weeks of therapy. Patients were followed up at six and twelve weeks to assess their healing, function, and problems. The chi-square test was used to determine the relationship between the length of conservative treatment and patient satisfaction. A p-value of ≤0.05 was considered statistically significant.

Results: The study had 80 participants, with a mean age of 38.1 ± 10.4 years and an equal gender distribution (40 males, 40 females). Overall, 58.7% of patients were satisfied with their therapy, with the 20-35 age group reporting the highest satisfaction (p = 0.0001). A strong relationship was discovered between follow-up findings and functional outcomes at both 6 and 12 weeks, with improved healing corresponding to higher functional scores (p = 0.0001). Furthermore, a considerable

relationship was seen between functional outcomes and patient satisfaction; persons with good or exceptional outcomes expressed great satisfaction, whereas those with fair or poor outcomes were largely dissatisfied (p = 0.0001). These findings emphasize the significance of early healing and imply that coexisting diseases may affect both recovery and patient satisfaction.

Conclusion: This study's findings indicate that non-surgical treatment of mid-shaft clavicular fractures results in successful outcomes for the majority of patients 12 weeks later. Patient satisfaction and healing rates showed a clear relationship with patient age, the existence of diabetic or hypertensive diseases, and their initial improvement at week six of the follow-up period.

Keywords: Association, Duration of Conservative Treatment, Patient Satisfaction, Mid Shaft Clavicle Fracture.

INTRODUCTION

The clavicle, an S-shaped bone, serves as a strut between the sternum and the glenohumeral joint, suspending the shoulder girdle via the coracoclavicular ligament (Iyer, 2023). Midshaft clavicle fractures are the most prevalent, accounting for 70%-80% of all clavicle fractures, with an annual incidence of around 64 per 100,000 people (Rowell, Perez de Salmeron, & Kapp, 2025). Open clavicular fractures remain uncommon (0.1%-1%) (Song & Kim, 2021). These injuries are frequently caused by high-energy trauma, such as car accidents or sports injuries, particularly among young, energetic people (Pennock et al., 2021). Midshaft clavicle fractures, which have traditionally been treated non-surgically, might cause long-term functional damage due to misalignment. Surgeon-based or radiographic assessments frequently underestimate functional limitations (Lim et al., 2023 ;). Recent study suggest that malunion may induce discontent due to fatigue and weakness in overhead tasks (Sonnier et al., 2023), which can be better recorded using patient-reported instruments such as the DASH score (IJspeert et al., 2022). In a population-based research of 200,000 adults aged 15 and above, clavicle fracture incidence was 50 per 100,000, greater in males (71) than girls (30), and bicycle accidents were the most common cause. (Ghori, Ahmed, & Khan, 2023).

Approximately 75% of clavicle fractures occur in the middle third and 25% at the acromial end (von Rüden et al., 2023). Most heal uneventfully, however non-union occurs in approximately 5% of fracture sites (Saragaglia & Refaie, 2021). Non-surgical treatment of displaced midshaft fractures increases the chance of non-union and lasting functional difficulties (Ephrem, 2022), while predicting such outcomes remains difficult. Although surgical treatment of mal unions frequently produces positive results, there is ongoing disagreement about whether initial surgery is necessary. Lateral-end fractures, which are more likely to fail to heal, can be asymptomatic in older patients and have less predictable surgical outcomes.

Different strength assessment methods have been used, such as a spring balance to measure force at 90° abduction, with a maximum recorded strength of 25 lb (11.3 kg), and the Nicholas manual muscle tester (Tully, 2022).

Closed reduction procedures for midshaft fractures frequently fail to maintain alignment (Han, Zhang, Zhang, & Tan, 2024), resulting in healing with distinct displacement patterns (Hecht & Markowitz, 2022). Although formerly assumed to cause minimal functional loss, new investigations employing DASH ratings have revealed common persistent deficits (Wang. I et al., 2021). One study of 105 polytrauma patients found an average DASH score of 32 (Ban et al., 2021), whereas Hill et al. reported a 31% unsatisfactory rate in nonoperative cases (Wiesel & Nagda, 2018).

METHODOLOGY

This cross-sectional study was conducted in the Dept. of Orthopaedic Surgery at Jinnah Postgraduate Medical Centre (JPMC), Karachi, from December 2024 to April 2025.The sample size was calculated based on a previous study reporting a percentage 17.5% satisfactory outcome of non-surgical management for clavicle fractures (McKee et al., 2006), with a 92% confidence level and an absolute precision of 8%, resulting in a required sample size of 69.15. After adjusting for a 10% non-response rate, the target sample was 77, and a total of 80 patients meeting the inclusion criteria were enrolled by non-probability consecutive sampling. Patients aged 15–65 years with closed midshaft clavicle fractures classified under Allman group I, NEER types 1 and 2, and AO types 15.2 A1–A3 and B1–B3. Open fractures, polytrauma, old fractures, and patients outside the age range were excluded.

Patients were advised on the risks and advantages, and following reduction, a figure-of-eight bandage or clavicular brace with sling support was used for six weeks. Follow-ups were performed at 6 and 12 weeks to evaluate clinical recovery, shoulder function, and radiological healing. The DASH questionnaire was used to assess functional outcomes, and the data was entered in a structured proforma.

Data Analysis Procedure

Data were analyzed using SPSS version 23.0. The mean and standard deviation (SD) were calculated for age and DASH scores. Frequencies and percentages were determined for gender, diabetes mellitus, hypertension, and patient satisfaction with treatment outcomes. The chi-square test was used to determine the relationship between such as age, gender, diabetes mellitus, and hypertension relationship between the length of conservative treatment and patient satisfaction. A p-value of ≤0.05 was considered statistically significant.

Ethical Considerations

- The study will be conducted after approval from the institutional review board (IRB) JPMC.
- Consent will be taken from all respondents i.e. patients and caregivers were explained about the purpose of data collection and study.
- Confidentiality of all records will be ensured with the anonymity of the respondents.

RESULTS

The average age of the 80 participants in the study was 38.1 ± 10.4 years. (Table 1) There were 40 males (50.0%) and 40 females (50.0%), indicating an equal gender distribution. (Fig. 1) According to age stratification, the largest percentage of participants (43.8%) were in the 20–35 age group, followed by those in the 36–50 age group (43.8%), while the smallest percentage (12.5%) were in the 51–65 age group. (Fig. 2) Thirty-three patients (41.3%) reported no meaningful change at the 6-week follow-up, while 47 people (58.8%) demonstrated clinical improvement. (Table 2) Twelve patients (15.0%) experienced non-union, 21 (26.3%) had delayed healing, and 47 (58.8%) had fully healed by the 12-week follow-up. (Table 3) Twelve participants (15.0%) reported poor functional outcomes, twenty-one (26.3%) had acceptable functional outcomes, thirty-one (30.8%) had good functional outcomes, and sixteen (20.0%) had excellent results. (Table 4) Additionally, there was a substantial correlation between follow-up findings and the functional outcomes. As compared to those who did not improve, all patients who shown improvement at 6 weeks had good or exceptional functional outcomes (p = 0.0001). (Table 5) At 12 weeks, a similar pattern was seen, with those who healed experiencing higher functional outcomes while those who had delayed healing or non-union saw fair or poor results (p = 0.0001). (Table 6)

Finally, there was a significant correlation (p = 0.0001) between functional outcomes and patient satisfaction. While individuals who had good or excellent functional outcomes expressed great satisfaction with their treatment, all participants who had poor or medium functional outcomes expressed discontent. (Table 7) The significance of early healing and the impact of coexisting diseases on treatment results and patient satisfaction are underscored by these findings.

Table 1: Age and DASH Score of the Study Participants

Features	Mean ± SD
Age	38.1 ± 10.4
DASH Score	41.6 ± 18.1

Table 2: Follow-Up At 6 Weeks of the Study Participants (N=80)

Follow-up at 6 weeks	Frequency	Percent
Improved	47	58.8
Not Improved	33	41.3
Total	80	100.0

Table 3: Follow-Up At 12 Weeks of the Study Participants (N=80)

Follow-up at 12 weeks	Frequency	Frequency
Delayed	21	26.3
Healed	47	58.8
Non-Union	12	15.0
Total	80	100.0

Table 4: Frequency of Functional Outcome of Being Treated With Non-Surgical Correction of Mid-Shaft Clavicular Fractures.

Functional Outcome	Frequency	Percent
Poor	12	15.0
Fair	21	26.3
Good	31	38.8
Excellent	16	20.0
Total	80	100.0

Table 5: Association of 6-Week Follow-Up with the Functional Outcome of Non-Surgical Correction of Mid-Shaft Clavicular Fractures.

Follow-up at 6 weeks	Functional Outcome				p-value
	Poor	Fair	Good	Excellent	
Improved	0	0	31	16	0.0001
No Change	12	21	0	0	
Total	12	21	31	16	

Table 6: Association of 12-Week Follow-Up with the Functional Outcome of Non-Surgical Correction of Mid-Shaft Clavicular Fractures.

Follow-up at 12 weeks	Functional Outcome				p-value
	Poor	Fair	Good	Excellent	
Delayed	0	21	0	0	0.0001
Healed	0	0	31	16	
Non-Union	12	0	0	0	
Total	12	21	31	16	

Table 7: Association of Patient Satisfaction with the Functional Outcome of Non-Surgical Correction of Mid-Shaft Clavicular Fractures.

Patient Satisfaction	Functional Outcome				p-value
	Poor	Fair	Good	Excellent	
No	12	21	0	0	0.0001
Yes	0	0	31	16	
Total	12	21	31	16	

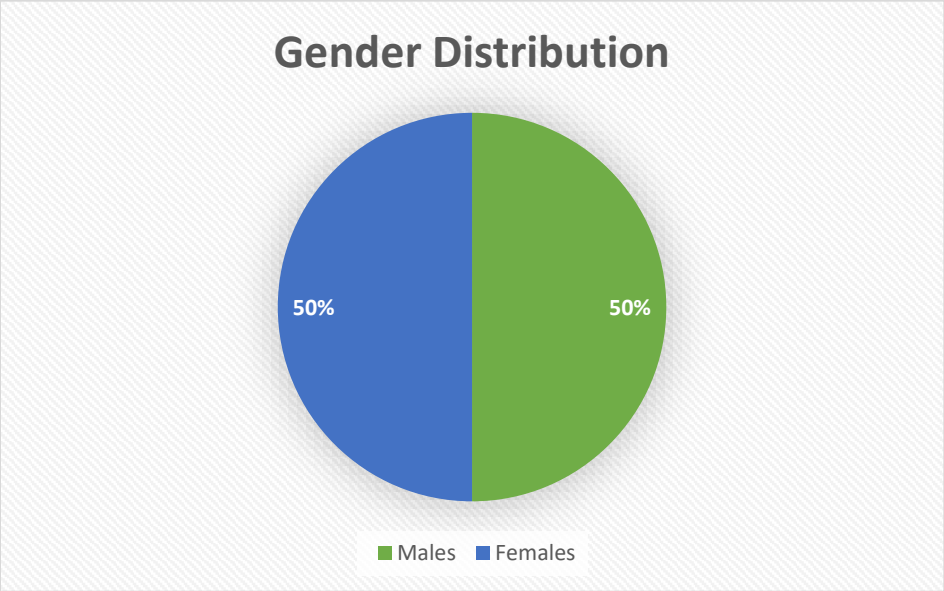

Figure 1: A Pie Chart Illustrating the Gender Distribution of the Study Participants

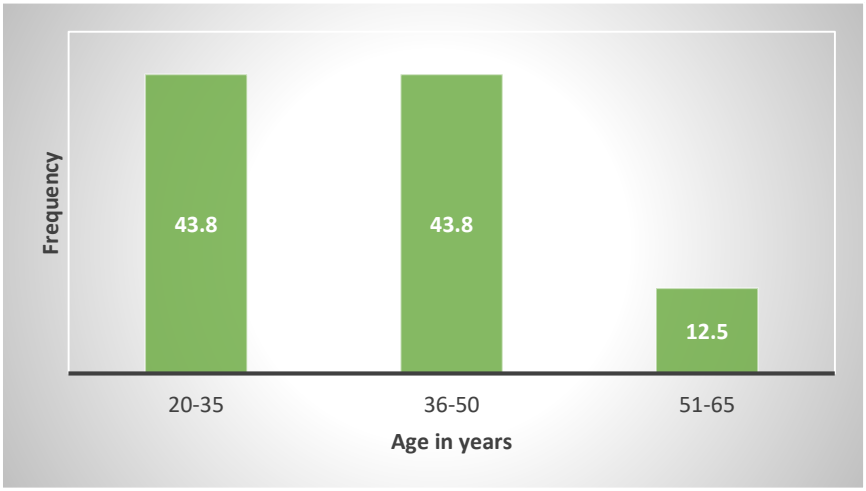

Figure 2: A Graph Illustrating the Frequency of Age Stratification of the Participants.

DISCUSSION

Our study data from 6-week follow-up periods served as strong indicators of long-term functional outcomes since every patient whose healing progressed well obtained good or excellent recovery results ($p = 0.0001$). Early progress in fracture healing stands as a critical predictor according to Blomstrand J. et al. (2022) since early delayed healing predicts extended rehabilitation and decreased satisfaction among patients.(Blomstrand, 2022).

Our study's overall healing rate of 58.8% at 12 weeks is consistent with previous research indicating that non-surgical management of mid-shaft clavicular fractures can result in high healing rates, though with some variation based on patient factors. A study by von Rüden C, et al. (2023) found a similar healing rate of 60% at 12 weeks, suggesting that conservative treatment remains an effective approach (von Rüden et al., 2023). However, our study reported a 15.0% non-union rate, similarly 16% non-union rate in non-operative management, reported by Martin JR et al. (2021).

The functional outcomes in our study, where 38.8% achieved good and 20.0% excellent recovery, are comparable to the findings of Hall JA et al. (2021), who reported that patients treated conservatively had similar functional outcomes to those undergoing surgical intervention after six months to one year of follow-up (Hall et al., 2021). However, our study found a significant difference in outcomes based on early follow-up results. Patients who showed improvement at six weeks were significantly more likely to achieve good or excellent functional recovery, emphasizing the

importance of early healing in determining long-term success.

Delayed healing along with non-union occurrences at 12 weeks evaluation period resulted in inferior functional outcomes in our study. (Bowers & Anderson, 2024) confirmed that patients healing slowly until week twelve demonstrated significantly higher risks for chronic pain and shoulder functioning problems beyond eventual bone union. (Bowers & Anderson, 2024). Early radiographic healing demonstrates its value as an important predictor for enduring results within fracture management without surgery.

CONCLUSION

The evidence from this study shows that mid-shaft clavicular fracture treatment through non-surgical methods leads to successful outcomes among most patients at 12 weeks post-treatment. Patient satisfaction alongside healing rates demonstrated clear dependence on both patient age and the presence of diabetic or hypertensive conditions together with their initial progress at week six of the follow-up period. The results show that conservative treatment works well but healthcare providers should analyze individual patient characteristics to achieve the best results. Early radiographic healing during follow-up assessments establishes a solid correlation to long-term functional outcomes which demonstrates the necessity of prompt follow-up examinations.

Limitation

This study's follow-up period was only 12 weeks, which may have missed long-term results. The sample size was modest, and the study was conducted in a single centre. Comorbidities may also have had an impact on recovery, however they were not thoroughly investigated.

Future Recommendations

- Patients should be closely monitored at 6 weeks to predict long-term healing outcomes and adjust treatment plans accordingly.
- Patients with diabetes, hypertension, and advanced age should be identified early for more intensive monitoring and possible alternative treatment strategies.
- Patients should be educated about expected recovery timelines, potential complications, and rehabilitation strategies to enhance adherence and satisfaction.
- Structured physiotherapy and rehabilitation protocols should be included in non-surgical management to improve functional outcomes and reduce long-term discomfort.
- Comparative studies should be conducted to determine whether surgical intervention provides better outcomes for high-risk patients.
- Future studies should evaluate the impact of smoking, nutrition, and physical activity on fracture healing to refine treatment guidelines further.
- Research should extend beyond the 12 weeks to assess long-term functional status, chronic pain, and patient-reported outcomes over a one-year follow-up.

REFFERENCES

1. Ban, I., Kristensen, M. T., Barfod, K. W., Eschen, J., Kallemose, T., & Troelsen, A. (2021). Neither operative nor nonoperative approach is superior for treating displaced midshaft clavicle fractures: a partially blinded randomized controlled clinical trial. The Bone & Joint Journal, 103(4), 762–768.
2. Blomstrand, J. (2022). Recovery after surgically treated distal radius fracture—Aspects of evaluation and rehabilitation.
3. Bowers, K. M., & Anderson, D. E. (2024). Delayed union and nonunion: current concepts, prevention, and correction: a review. Bioengineering, 11(6), 525.
4. Ephrem, B. (2022). The Outcome of Conservative Versus Operative Management of Humerus Shaft Fractures and Associated Factors at Tibebe Ghion Specialized Hospital From February 2020–February 2022.
5. Ghori, F. S., Ahmed, K., & Khan, K. M. (2023). The Frequency of Unsatisfied Patients Treated Conservatively for Midshaft Clavicle Fractures.
6. Hall, J. A., Schemitsch, C. E., Vicente, M. R., Dehghan, N., Nauth, A., Nowak, L. L., . . . McKee, M. D. (2021). Operative versus nonoperative treatment of acute displaced distal clavicle fractures: a multicenter randomized controlled trial. Journal of Orthopaedic Trauma, 35(12), 660–666.
7. Han, X., Zhang, Y., Zhang, X., & Tan, J. (2024). Comprehensive comparison between conservative therapy and surgical management for completely displaced and comminuted mid-shaft

clavicle fractures. International Orthopaedics, 48(7), 1871–1877.

8. Hecht, A., & Markowitz, J. S. (2022). Spine Dislocations and Fractures. In Clinical Guide to Musculoskeletal Medicine: A Multidisciplinary Approach (pp. 101–116): Springer.
9. IJspeert, J., Lustenhouwer, R., Janssen, R. M., Han, J. J., Hatch, M. N., Cameron, I., . . . Geurts, A. C. (2022). Reachable workspace analysis is a potential measurement for impairment of the upper extremity in neuralgic amyotrophy. Muscle & Nerve, 66(3), 282–288.
10. Iyer, K. M. (2023). Examination of the Shoulder. In Introduction to Limb Arthrology (pp. 45–139): Jenny Stanford Publishing.
11. Lim, K., Olandres, R., Cheow, X., Thng, M., Teo, N., Pereira, N., . . . Lee, N. (2023). Do We Ever Need to Fix Clavicle Fractures in Adolescents? Malaysian Orthopaedic Journal, 17(3), 33.
12. Martin, J. R., Saunders, P. E., Phillips, M., et al. (2021). Comparative effectiveness of treatment options for displaced midshaft clavicle fractures. Bone & Joint Open, 2(8), 646–654. https://doi.org/10.1302/2633-1462.28.BJO-2021-0112.R1
13. McKee, M. D., Pedersen, E. M., Jones, C., Stephen, D. J., Kreder, H. J., Schemitsch, E. H., . . . Potter, J. (2006). Deficits following nonoperative treatment of displaced midshaft clavicular fractures. JBJS, 88(1), 35–40.
14. Pennock, A. T., Heyworth, B. E., Bastrom, T., Bae, D. S., Boutelle, K. E., Busch, M. T., . . . Kocher, M. S. (2021). Changes in superior displacement, angulation, and shortening in the early phase of healing for completely displaced midshaft clavicle fractures in adolescents: results from a prospective, multicenter study. Journal of Shoulder and Elbow Surgery, 30(12), 2729–2737.
15. Rowell, J., Perez de Salmeron, S., & Kapp, C. M. (2025). Diagnostic and Therapeutic Approach to Pneumothorax. Principles and Practice of Interventional Pulmonology, 1–11.
16. Saragaglia, D., & Refaie, R. (2021). Displaced mid-shaft clavicular fractures: state of the art for athletes and young active people. International Orthopaedics, 45, 2679–2686.
17. Song, H. S., & Kim, H. (2021). Current concepts in the treatment of midshaft clavicle fractures in adults. Clinics in Shoulder and Elbow, 24(3), 189.
18. Sonnier, J. H., Ciccotti, M. C., Darius, D., Hall, A. T., Freedman, K. B., & Tjoumakaris, F. (2023). Scapular Dyskinesis in the Athletic Patient: A Sport-Specific Review. JBJS Reviews, 11(2), e22.
19. Tully, P. L. (2022). Screening for risk factors associated with non-specific shoulder pain in male adolescent water polo players.
20. von Rüden, C., Rehme-Röhrl, J., Augat, P., Friederichs, J., Hackl, S., Stuby, F., & Trapp, O. (2023). Evidence on treatment of clavicle fractures. Injury, 54, 110818.
21. Wang, I., Kapellusch, J., Rahman, M. H., Lehman, L., Liu, C.-J., & Chang, P.-F. (2021). Psychometric evaluation of the disabilities of the arm, shoulder and hand (DASH) in patients with orthopedic shoulder impairments seeking outpatient rehabilitation. Journal of Hand Therapy, 34(3), 404–414.
22. Wiesel, B., & Nagda, S. (2018). Management of midshaft clavicle fractures in adults. JAAOS–Journal of the American Academy of Orthopaedic Surgeons, 26(22), e468–e476.