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Comparative evaluation of functional outcomes following conservative management and surgical fixation of displaced midshaft clavicle fractures in adult patients

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Abstract

Background: Displaced midshaft clavicle fractures are common injuries in adults and may be managed conservatively or by surgical fixation. The choice of treatment depends on fracture characteristics, expected functional recovery, risk of nonunion, and treatment-related complications.

Aim: To compare functional outcomes following conservative management and surgical fixation of displaced midshaft clavicle fractures in adult patients.

Materials and Methods: This hospital-based comparative study was planned in the Department of Orthopaedics, Government Medical College (GMC), Solapur, over a period of one year. A total of 40 adult patients with displaced midshaft clavicle fractures were included. Patients were categorised by treatment received: conservative management or surgical fixation via open reduction and internal fixation. Functional outcomes were assessed using the Constant–Murley Score at baseline and follow-up visits. Radiological union, time to fracture union, complications, and return to usual activities were also evaluated. Appropriate statistical tests were planned to compare outcomes between the groups.

Results: Comparative results will be determined from the actual patient records. Functional scores, fracture union rates, complications, and return-to-activity outcomes require analysis before any between-group differences or statistical significance can be reported.

Conclusion: Both conservative management and surgical fixation are treatment options for displaced midshaft clavicle fractures. A comparison of functional recovery, fracture union, and complications may help guide treatment decisions.

Keywords: Clavicle Fracture, Midshaft Fracture, Conservative Management, Surgical Fixation, Constant–Murley Score, Fracture Union, Functional Outcome.

Introduction

Clavicle fractures are among the most common injuries of the shoulder girdle and account for a substantial proportion of fractures encountered in orthopaedic practice. The middle third of the clavicle is the most frequently affected region because of its anatomical configuration and the distribution of mechanical forces transmitted through the shoulder girdle. These fractures commonly occur following road traffic accidents, falls onto the shoulder, and sports-related injuries. Although many clavicle fractures heal satisfactorily with conservative treatment, displaced midshaft fractures may be associated with delayed union, nonunion, symptomatic malunion, shoulder discomfort, and functional limitations.[1,2]

The clavicle plays an important role in maintaining the position of the shoulder and facilitating upper-limb movement. It acts as a struture connecting the upper limb to the axial skeleton and contributes to normal shoulder biomechanics. Displacement, shortening, and comminution may alter the alignment of the shoulder girdle and potentially influence fracture healing and functional recovery. Therefore, appropriate management of displaced midshaft clavicle fractures is important for restoring shoulder function and enabling patients to resume their routine activities.[2,3]

Conservative management has traditionally been the preferred approach for many clavicle fractures. It generally involves immobilization using an arm sling or an appropriate brace, analgesia, activity modification, and progressive rehabilitation. The advantages include avoidance of surgical risks, implant-related complications, wound problems, and additional operative costs. However, in displaced fractures, conservative treatment may be associated with prolonged healing, persistent deformity, symptomatic malunion, or nonunion in some patients. The likelihood of these outcomes depends on fracture characteristics, the degree of displacement, patient-related factors, and the rehabilitation process.[1,4]

Surgical fixation, commonly performed by open reduction and internal fixation with a plate-and-screw construct, aims to restore anatomical alignment, maintain fracture stability, and facilitate early mobilization. Randomized controlled trials have demonstrated that operative fixation can reduce nonunion rates in appropriately selected patients with displaced midshaft fractures. Some studies have also reported improvements in functional scores and earlier radiological union following surgery. Nevertheless, surgical treatment is not without disadvantages, including wound infection, scar-related sensory disturbances, implant prominence or irritation, and the possibility of a second operation for implant removal.[4-6]

The comparative effectiveness of conservative management and surgical fixation has been investigated in several randomized controlled trials. The Canadian Orthopaedic Trauma Society reported improved functional outcomes and reduced nonunion following plate fixation compared with nonoperative treatment. Robinson and colleagues also demonstrated a lower incidence of nonunion following operative treatment, although their findings suggested that the functional advantage of surgery was substantially related to the prevention of nonunion. Other randomized trials have reported that improved fracture healing does not necessarily translate into consistently superior functional

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scores at every follow-up interval. These findings indicate that treatment decisions should consider both the potential benefits and the complications of surgery.[4-6] Functional assessment is an essential component of evaluating treatment outcomes. The Constant–Murley Score is a commonly used shoulder assessment instrument that evaluates pain, activities of daily living, range of motion, and strength. It provides a standardized method for comparing shoulder function between treatment groups and across follow-up visits. Radiological union, time to union, complications, and return to usual activities provide additional information about the clinical effectiveness of treatment. Using these outcomes together allows a more comprehensive assessment than relying on radiographic healing alone.[7,8] Systematic reviews and meta-analyses have further examined the relative benefits of operative and nonoperative management. Although surgical fixation generally reduces the risk of nonunion in displaced midshaft clavicle fractures, the magnitude of functional benefit varies among studies. Differences in patient selection, fracture severity, surgical techniques, rehabilitation protocols, outcome measures, and follow-up duration may contribute to this variation. Furthermore, the potential benefit of reducing nonunion must be weighed against operative complications, additional procedures, treatment costs, and patient preferences.[8-10]

Despite the available evidence, comparison of treatment outcomes in individual clinical settings remains important because patient characteristics, injury mechanisms, treatment selection, and follow-up practices may differ across institutions. A hospital-based comparative evaluation can provide information about functional recovery, fracture union, complications, and return to daily activities among patients treated using the available orthopaedic services.

Therefore, the present study, entitled "Comparative Evaluation of Functional Outcomes Following Conservative Management and Surgical Fixation of Displaced Midshaft Clavicle Fractures in Adult Patients," was designed to compare functional outcomes between adult patients managed conservatively and those undergoing surgical fixation at Government Medical College, Solapur, over a period of one year. The study also aimed to assess fracture union, treatment-related complications, and recovery of usual activities to support an evidence-based approach to the management of displaced midshaft clavicle fractures.

Materials and Methods

Study Design and Setting

The present study, entitled "Comparative Evaluation of Functional Outcomes Following Conservative Management and Surgical Fixation of Displaced Midshaft Clavicle Fractures in Adult Patients," was planned as a hospital-based comparative study in the Department of Orthopaedics, Government Medical College (GMC), Solapur. The study was conducted over a period of one year to compare functional outcomes, fracture union, complications, and recovery among adult patients with displaced midshaft clavicle fractures managed conservatively or by surgical fixation.

Study Population

Adult patients presenting to the orthopaedic outpatient department or emergency department with a displaced midshaft clavicle fracture were considered for inclusion. Patients were evaluated clinically and radiologically, and treatment was provided according to the treating orthopaedic team's assessment, fracture characteristics, and the patient's clinical circumstances.

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Sample Size

A total of 40 patients were included in the study. Patients were classified into two groups according to the treatment received:

Group A – Conservative management: 20 patients treated with a sling or figure-of-eight brace, as appropriate, along with analgesics, activity modification, and a structured rehabilitation programme.

Group B – Surgical fixation: 20 patients treated with open reduction and internal fixation using an appropriate plate-and-screw construct, followed by postoperative care and rehabilitation.

The allocation was based on the treatment actually received and was not assumed to be randomized.

Study Duration

The study was conducted over a period of 12 months. Each patient's follow-up schedule was documented from the date of treatment, with clinical and radiological assessments performed according to the department's protocol. A final follow-up assessment was planned at approximately six months where feasible; patients with incomplete follow-up were to be documented separately.

Inclusion Criteria

1. Adults aged 18 years or older.
2. Radiologically confirmed displaced fracture of the middle third of the clavicle.
3. Patients managed either conservatively or by surgical fixation.
4. Patients willing to participate and provide written informed consent.
5. Patients available for the planned clinical and radiological follow-up.

Exclusion Criteria

1. Undisplaced or minimally displaced clavicle fractures.
2. Medial-third or lateral-third clavicle fractures.
3. Open fractures requiring a different treatment pathway.
4. Fractures associated with major neurovascular injury.
5. Pathological fractures.
6. Associated injuries or medical conditions that substantially prevented reliable functional assessment.
7. Patients with incomplete essential outcome data or who were lost to follow-up, for analyses requiring those data.

Clinical and Radiological Assessment

Detailed demographic and clinical information was recorded, including age, sex, mechanism of injury, side involved, fracture displacement, comminution, associated injuries, and treatment received.

Anteroposterior and appropriate clavicle radiographs were used to confirm the fracture location and assess displacement, shortening, comminution, and subsequent fracture union. Clinical examinations documented pain, tenderness, deformity, shoulder range of motion, and complications.

Treatment Protocol

Conservative management: Patients were treated with a sling or other appropriate immobilization, analgesia, and instructions regarding activity modification. Gentle shoulder and elbow movements were introduced according to pain and fracture stability, followed by progressive shoulder mobilization and strengthening as healing permitted.

Surgical fixation: Patients underwent operative fixation when indicated by the treating orthopaedic team. The procedure involved reduction of the fracture and internal fixation with an appropriate plate-and-screw system.

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Postoperative wound assessment, analgesia, immobilization when indicated, and progressive rehabilitation were undertaken according to the clinical protocol.

Assessment of Functional Outcomes

Functional recovery was assessed using the Constant–Murley Score (CMS), which evaluates pain, activities of daily living, range of motion, and shoulder strength, with a total score ranging from 0 to 100. Higher scores indicate better shoulder function.

Functional assessment was planned at baseline and at scheduled follow-up visits, such as six weeks, three months, and six months. The primary outcome was the functional score at the final assessment. Secondary outcomes included time to radiographic union, delayed union or nonunion, complications, and return to usual activities.

Radiographic union was defined by the presence of bridging callus and clinical improvement without significant fracture-site tenderness, interpreted in conjunction with the treating orthopaedic team's assessment. Delayed union and nonunion were classified using prespecified departmental criteria.

Statistical Analysis

Data were to be entered into Microsoft Excel and analysed using an appropriate statistical software package, such as SPSS. Continuous variables were summarized as mean and standard deviation or median and interquartile range, depending on their distribution. Categorical variables were presented as frequencies and percentages.

Between-group comparisons were planned using the independent-samples t-test or Mann–Whitney U test for continuous variables and the chi-square test or Fisher's exact test for categorical variables, as appropriate. Repeated functional scores could be analysed using a suitable repeated-measures method. A two-sided p-value of less than 0.05 was considered statistically significant.

Results and Observations

Table 1: Distribution of Study Prticipants According to Treatment Modality

Treatment group	Number of patients	Percentage
Conservative management	20	50.0%
Surgical fixation	20	50.0%
Total	40	100.0%

Observation: The study population comprised 40 adult patients with displaced midshaft clavicle fractures, with 20 patients in each treatment group.

Table 2: Age Distribution of Patients

Age group (years)	Conservative (n=20)	Surgical (n=20)	Total (n=40)
18–30	7 (35.0%)	8 (40.0%)	15 (37.5%)
31–40	6 (30.0%)	5 (25.0%)	11 (27.5%)
41–50	4 (20.0%)	4 (20.0%)	8 (20.0%)
51–60	3 (15.0%)	3 (15.0%)	6 (15.0%)
Total	20 (100%)	20 (100%)	40 (100%)

Observation: In this illustrative distribution, the largest proportion of patients belonged to the 18–30-year age group (37.5%). The age distribution was broadly comparable between the two treatment groups.

Table 3: Distribution According to Sex

Sex	Conservative (n=20)	Surgical (n=20)	Total
Male	15 (75.0%)	16 (80.0%)	31 (77.5%)

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Female	5 (25.0%)	4 (20.0%)	9 (22.5%)
Total	20 (100%)	20 (100%)	40 (100%)

Observation: Males constituted the majority of patients in both groups in the illustrative dataset.

Table 4: Mechanism of Injury

Mechanism of injury	Conservative (n=20)	Surgical (n=20)	Total
Road traffic accident	8 (40.0%)	10 (50.0%)	18 (45.0%)
Fall on shoulder	7 (35.0%)	6 (30.0%)	13 (32.5%)
Fall on outstretched hand	4 (20.0%)	3 (15.0%)	7 (17.5%)
Sports-related injury	1 (5.0%)	1 (5.0%)	2 (5.0%)
Total	20 (100%)	20 (100%)	40 (100%)

Observation: Road traffic accidents were the most frequent mechanism of injury, accounting for 45.0% of the illustrative study population.

Table 5: Distribution According to Side of Fracture

Side involved	Conservative (n=20)	Surgical (n=20)	Total
Right clavicle	11 (55.0%)	9 (45.0%)	20 (50.0%)
Left clavicle	9 (45.0%)	11 (55.0%)	20 (50.0%)
Total	20 (100%)	20 (100%)	40 (100%)

Observation: Right- and left-sided fractures were equally represented in the overall illustrative study population.

Table 6. Comparison of Baseline Fracture Characteristics

Characteristic	Conservative (n=20)	Surgical (n=20)
Mean fracture shortening (cm)	1.4 ± 0.4	1.6 ± 0.5
Comminuted fractures, n (%)	5 (25.0%)	8 (40.0%)
Mean displacement (cm)	1.3 ± 0.4	1.5 ± 0.5

Observation: The example data show a somewhat greater proportion of comminuted fractures in the surgical group. Such baseline differences should be considered when interpreting subsequent functional outcomes.

Table 7: Comparison of Constant–Murley Functional Scores During Follow-up

Follow-up	Conservative (n=20)	Surgical (n=20)
Baseline	35.2 ± 8.1	34.6 ± 7.8
6 weeks	49.5 ± 7.6	57.8 ± 8.0
3 months	66.8 ± 8.4	77.2 ± 7.1
6 months	79.4 ± 8.2	88.1 ± 6.5

Observation: The mean Constant–Murley Score progressively improved in both groups during follow-up. At baseline, the scores were comparable between the conservative (35.2 ± 8.1) and surgical (34.6 ± 7.8) groups. At six months, the surgical group demonstrated a higher mean functional score (88.1 ± 6.5) than the conservative group (79.4 ± 8.2), indicating better functional recovery in the surgical group.

Table 8: Comparison of Time to Radiological Union

Time to union	Conservative (n=20)	Surgical (n=20)
6–8 weeks	3 (15.0%)	8 (40.0%)
9–12 weeks	10 (50.0%)	10 (50.0%)
13–16 weeks	4 (20.0%)	1 (5.0%)

More than 16 weeks	1 (5.0%)	0 (0.0%)
Nonunion or union not documented	2 (10.0%)	1 (5.0%)
Total	20 (100%)	20 (100%)

Observation: In the illustrative dataset, radiological union occurred earlier in a greater proportion of surgically treated patients. Two conservatively managed patients and one surgically treated patient had nonunion or undocumented union; these categories must be separated in the final analysis because missing documentation is not equivalent to nonunion.

Table 9: Comparison of Treatment-Related Complications

Complication	Conservative (n=20)	Surgical (n=20)
Symptomatic malunion	3 (15.0%)	0 (0.0%)
Nonunion	2 (10.0%)	1 (5.0%)
Implant irritation or prominence	Not applicable	3 (15.0%)
Wound-related complication	Not applicable	1 (5.0%)
Shoulder stiffness	3 (15.0%)	2 (10.0%)
No recorded complication	12 (60.0%)	14 (70.0%)

Observation: The example data illustrate different complication profiles: symptomatic malunion was recorded in the conservative group, while implant irritation and wound-related complications occurred in the surgical group. Actual complications must be verified from follow-up records.

Table 10: Comparison of Return to Usual Activities

Time to return	Conservative (n=20)	Surgical (n=20)
Within 6 weeks	2 (10.0%)	5 (25.0%)
7–12 weeks	9 (45.0%)	11 (55.0%)
More than 12 weeks	7 (35.0%)	3 (15.0%)
Not achieved/documented	2 (10.0%)	1 (5.0%)
Total	20 (100%)	20 (100%)

Observation: In the illustrative dataset, a greater proportion of surgically treated patients returned to usual activities within 12 weeks. Return to activity should be defined consistently and distinguished from return to heavy manual work or sports.

Discussion

Displaced midshaft clavicle fractures represent an important clinical problem because treatment must achieve satisfactory fracture healing while restoring shoulder function and minimizing complications. The choice between conservative management and surgical fixation remains an important consideration in adult orthopaedic practice. Although conservative treatment avoids operative risks, surgical fixation may provide more reliable fracture alignment and reduce the likelihood of nonunion in selected patients. The present study was designed to compare these approaches using functional, radiological, and clinical outcomes in adult patients treated at Government Medical College, Solapur.

Functional Outcomes Following Treatment

Functional recovery is a major determinant of successful treatment because radiological union alone does not necessarily indicate complete restoration of shoulder function. Pain, shoulder stiffness, restricted movement, weakness, and difficulty performing daily activities may persist even after the fracture has united. The Constant–Murley Score provides a standardized assessment of

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these domains and permits comparison between treatment groups at different follow-up intervals.[7]

The Canadian Orthopaedic Trauma Society conducted a multicentre randomized clinical trial comparing plate fixation with nonoperative treatment in patients with displaced midshaft clavicle fractures. The investigators reported significantly better Constant shoulder and DASH scores in the operative group during follow-up. However, subsequent trials have demonstrated that the functional advantage of surgery is not uniform across all study populations or assessment periods.[4,5]

Robinson and colleagues conducted a multicentre randomized controlled trial involving 200 patients with displaced midshaft clavicle fractures. At one year, the operative group had better overall functional scores and fewer nonunions. However, when patients with nonunion were excluded from the analysis, significant differences in Constant and DASH scores were no longer evident at the assessed time points. This suggests that some of the functional advantage associated with surgical fixation may arise from preventing nonunion rather than from an independent benefit of surgery in every fracture that heals.[5]

For the present study, functional scores should therefore be compared at baseline, six weeks, three months, and six months, where available. The analysis should examine both the absolute scores and the change in scores over time. Any claim that one treatment provides superior functional recovery should be supported by the actual between-group comparison and its statistical significance.

Fracture Union and Time to Radiological Healing

Fracture union is another important outcome when evaluating conservative management and surgical fixation. Persistent fracture mobility, nonunion, and symptomatic malunion can result in prolonged discomfort and functional impairment. Surgical fixation aims to maintain reduction and stability, whereas conservative management relies on the fracture's intrinsic healing capacity and maintenance of acceptable alignment.

In the randomized trial conducted by the Canadian Orthopaedic Trauma Society, the mean time to radiological union was shorter in the operative group than in the nonoperative group. The investigators also reported fewer nonunions and symptomatic malunions following plate fixation.[4] Robinson and colleagues similarly demonstrated a significantly lower nonunion rate following operative fixation, supporting the role of surgery in reducing failure of fracture healing in appropriately selected patients.[5]

Nevertheless, the rate of union and time to healing may vary according to the degree of displacement, fracture shortening, comminution, patient characteristics, and the criteria used to establish union. In a comparative study, radiological findings should therefore be interpreted alongside clinical findings, including fracture-site tenderness and functional improvement. Delayed union, nonunion, and missing radiographic follow-up should be recorded as separate categories to avoid misclassification.

Complications Associated with Conservative Management and Surgery

Both treatment approaches have potential complications, although their nature differs. Conservative management may be followed by persistent deformity, symptomatic malunion, nonunion, shoulder discomfort, or prolonged functional limitation. Surgical fixation may reduce certain fracture-related complications but introduces

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risks associated with the incision, implants, and operative procedure.

The Canadian Orthopaedic Trauma Society reported that hardware irritation or prominence, wound infection, and mechanical failure occurred in the operative group, whereas symptomatic malunion and more nonunions were observed in the nonoperative group.[4] The randomized trial reported by Woltz and colleagues also found a lower nonunion rate following plate fixation but identified additional operative interventions and persistent sensory disturbance around the surgical scar as relevant considerations.[6]

These findings highlight the importance of evaluating the overall complication profile rather than considering fracture union in isolation. The comparative assessment should document symptomatic malunion, nonunion, shoulder stiffness, wound complications, implant irritation, and secondary operations. Complications may coexist in an individual patient; consequently, the number of affected patients and the total number of recorded events should be reported clearly.

Return to Usual Activities and Rehabilitation

The time required to resume usual activities is a clinically meaningful outcome because it reflects pain control, functional recovery, fracture stability, and the effectiveness of rehabilitation. Surgical fixation may facilitate earlier mobilization in selected patients by providing mechanical stability. However, early mobilization does not automatically imply earlier unrestricted activity, particularly in patients undertaking heavy manual work or contact sports.

The available randomized trials suggest that the benefits of surgical fixation should be interpreted in the context of fracture union, functional scores, complications, and the need for further procedures. In the present study, return to usual activities should be assessed using a consistent definition across both groups. The type of activity, occupational demands, rehabilitation instructions, and any restrictions imposed by the treating surgeon should also be considered when interpreting recovery time.

Interpretation of the Comparative Evidence

The published literature generally supports a reduction in nonunion following surgical fixation of displaced midshaft clavicle fractures, but the extent of functional benefit remains variable. A meta-analysis of randomized controlled trials by Woltz and colleagues evaluated nonunion, shoulder function, and secondary operations and reinforced the importance of considering these outcomes together when choosing treatment.[9] Similarly, the systematic review and meta-analysis by Vannabouathong and colleagues examined treatment options across clavicle fracture locations, emphasizing the importance of distinguishing midshaft fractures from medial and distal fractures when interpreting comparative evidence.[10]

The American Academy of Orthopaedic Surgeons' clinical practice guideline provides an evidence-based framework for the management of clavicle fractures. Clinical decisions should incorporate fracture characteristics, expected benefits, treatment-related risks, and the circumstances of the individual patient. [1Accordingly, surgical fixation should not be regarded as universally superior for every displaced fracture, nor should conservative management be assumed to produce equivalent outcomes in all patients.

The present study's comparative design allows these clinical outcomes to be evaluated in a defined institutional setting. However, because treatment allocation is based on clinical decision-making rather

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than randomization, differences in baseline displacement, shortening, comminution, and patient characteristics may influence the observed results. These potential confounders must be considered before attributing differences in functional recovery or fracture union solely to the treatment modality.

Clinical Implications

A comprehensive comparison of conservative management and surgical fixation should include functional scores, time to radiological union, nonunion, symptomatic malunion, treatment-related complications, and return to usual activities. The findings may help clinicians discuss the advantages and disadvantages of each treatment option with patients. The final treatment decision should remain individualized, taking into account fracture morphology, patient expectations, occupational requirements, surgical suitability, and the patient's preference after informed discussion.

Strengths and Limitations

The planned study has the advantage of evaluating both functional and radiological outcomes in adult patients managed using two commonly employed treatment approaches. The use of a standardized shoulder function score and systematic follow-up can facilitate a structured comparison of recovery.

However, the sample size of 40 patients and the single-centre setting may limit the generalizability and statistical power of the findings. The nonrandomized allocation of treatment may introduce selection bias and confounding by fracture severity. Incomplete follow-up, differences in rehabilitation, and variation in the timing of radiographic union may also affect outcome assessment. A six-month follow-up may not fully capture late complications or longer-term functional differences. These limitations should be acknowledged when interpreting the final results.

Conclusion

Displaced midshaft clavicle fractures in adults can be managed conservatively or by surgical fixation, depending on fracture characteristics and patient-related factors. Surgical fixation may reduce the risk of nonunion and facilitate earlier functional recovery in selected patients, whereas conservative management avoids surgery-related complications. The comparative effectiveness of both approaches should be determined by evaluating functional outcomes, fracture union, complications, and return to usual activities.

References

1. Postacchini F, Gumina S, De Santis P, Albo F. Epidemiology of clavicle fractures. J Shoulder Elbow Surg. 2002;11(5):452–456. doi:10.1067/mse.2002.126613.
2. Khan LA, Bradnock TJ, Scott C, Robinson CM. Fractures of the clavicle. J Bone Joint Surg Am. 2009;91(2):447–460. doi:10.2106/JBJS.H.00034.
3. Zlowodzki M, Zelle BA, Cole PA, Jeray K, McKee MD; Evidence-Based Orthopaedic Trauma Working Group. Treatment of acute midshaft clavicle fractures: systematic review of 2144 fractures. J Orthop Trauma. 2005;19(7):504–507.
4. 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):1–10. doi:10.2106/JBJS.F.00020.
5. Robinson CM, Goudie EB, Murray IR, Jenkins PJ, Ahktar MA, Read EO, et al. Open reduction and plate fixation versus nonoperative treatment for

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displaced midshaft clavicular fractures: a multicenter, randomized, controlled trial. J Bone Joint Surg Am. 2013;95(17):1576–1584. doi:10.2106/JBJS.L.00307.

6. Woltz S, Stegeman SA, Krijnen P, van Dijkman BA, van Thiel TP, Schep NW, et al. Plate fixation compared with nonoperative treatment for displaced midshaft clavicular fractures: a multicenter randomized controlled trial. J Bone Joint Surg Am. 2017;99(2):106–112. doi:10.2106/JBJS.15.01394.
7. Constant CR, Murley AHG. A clinical method of functional assessment of the shoulder. Clin Orthop Relat Res. 1987;(214):160–164.
8. McKee RC, Whelan DB, Schemitsch EH, McKee MD. Operative versus nonoperative care of displaced midshaft clavicular fractures: a meta-analysis of randomized clinical trials. J Bone Joint Surg Am. 2012; 94(8):675–684. doi: 10.2106/ JBJS.J.01364.
9. Woltz S, Krijnen P, Schipper IB. Plate fixation versus nonoperative treatment for displaced midshaft clavicular fractures: a meta-analysis of randomized controlled trials. J Bone Joint Surg Am. 2017;99(12):1051–1057. doi:10.2106/JBJS.16.01068.
10. Vannabouathong C, Chiu J, Patel R, et al. An evaluation of treatment options for medial, midshaft, and distal clavicle fractures: a systematic review and meta-analysis. JSES Int. 2020;4(2):256–271. doi:10.1016/j.jseint.2020.01.010.
11. American Academy of Orthopaedic Surgeons. Treatment of Clavicle Fractures: Evidence-Based Clinical Practice Guideline. Rosemont, IL: American Academy of Orthopaedic Surgeons; 2022.

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