ORIGINAL ARTICLE

Conservative versus Operative Management for Middle Third Clavicle Fractures in Kathmandu Model Hospital

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ABSTRACT

Introduction: Middle third clavicle fractures are common, with treatment options including conservative and operative approaches. This retrospective observational study compares the efficacy, functional outcomes, and complications of these methods at Kathmandu Model Hospital.

Methods: Medical records of 80 patients (40 per group) treated between January 2018 and December 2024 were analyzed. Outcomes were evaluated using the Constant-Murley Score (CMS), Disabilities of the Arm, Shoulder, and Hand (DASH) score, radiological union time, and complication rates.

Results: Operative management achieved bone union in 10.2 weeks compared to 14.5 weeks for conservative treatment, with better early functional scores at 6 and 12 weeks, but reported higher complications (22.5% versus 15%), including infections and hardware issues. Conservative management had a 10% non-union rate and more malunion but fewer surgical complications.

Conclusion: Operative management demonstrated faster union and better early functional outcomes, while conservative management had fewer complications but prolonged recovery. These results offer valuable guidance for making treatment decisions in settings with limited resources.

Keywords: clavicle fracture, Constant-Murley score, malunion, Dash score.

INTRODUCTION

Clavicle fractures constitute 2.6–4% of all fractures, with 80–85% occurring in the middle third due to its biomechanical vulnerability.[1] These injuries often result from trauma such as road traffic accidents or falls, impacting active populations. Treatment options include conservative management, involving immobilization with slings or figure-of-eight bandages, and operative management, such as open reduction and internal fixation (ORIF) or intramedullary nailing.[2] While operative treatment has gained popularity for faster recovery and lower non-union rates, conservative management remains common in resource-limited settings due to lower costs and accessibility. Patient-specific factors, such as activity level, fracture displacement, and socio-economic constraints, significantly influence treatment outcomes.[3,4] This retrospective study evaluates conservative versus operative management for middle third clavicle fractures, focusing on functional recovery, union rates, and complications in a Nepalese context.

METHODS

An observational study was conducted at Kathmandu Model Hospital, analyzing medical records of patients treated for middle third clavicle fractures (AO/OTA type 15-B) between January 2018 and December 2024. Inclusion criteria were patients aged 18–60

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years with isolated, displaced fractures. Exclusion criteria included open fractures, neurovascular injuries, or comorbidities affecting bone healing (e.g., diabetes, osteoporosis). Of 92 eligible patients, 80 were selected (40 per group) based on complete records and treatment type i.e.; conservative or operative. Conservative group included patients received a figure-of-eight bandage with arm pouch immobilization for 4–6 weeks, followed by physiotherapy, as per standard protocols. Follow-up records included clinical and radiological assessments. Operative group included patients underwent Open reduction internal fixation (ORIF) with locking compression plates. Post-operative rehabilitation began at two weeks. Primary outcomes included; functional outcomes which was assessed using the Constant-Murley Score (CMS) and Disabilities of the Arm, Shoulder, and Hand (DASH) score at 6, 12, and 24 weeks post-treatment.

Data were extracted from electronic medical records, including demographics, injury mechanism, treatment details, and outcome measures. Statistical analysis was performed using SPSS version 25. Continuous variables (CMS, DASH scores, union time) were compared using independent t-tests, and categorical variables, complication rates were analyzed with chi-square tests. A p-value <0.05 was considered significant.

RESULTS

The demographic characteristics of the study population are summarized in Table 1. The conservative group had a mean age of 35.1 ± 11.2 years, and the operative group 33.4 ± 10.5 years (p=0.52). In the conservative group, males accounted for 62.5%, while in the operative group, they made up 67.5% (p = 0.64). Injury mechanisms included road traffic accidents (52.5%), falls (32.5%), and sports injuries (15%), consistent with epidemiological data.

Table 1: Demographic characteristics of study population (n=80)

Characteristic	Conservative Group (n=40)	Operative Group (n=40)	p-value
Age (years, mean ± SD)	35.1 ± 11.2	33.4 ± 10.5	0.52
Male	62.5% (25/40)	67.5% (27/40)	0.64
Injury Mechanism			
Road Traffic Accidents	52.5% (21/40)	52.5% (21/40)	1.00
Falls	32.5% (13/40)	32.5% (13/40)	1.00
Sports Injuries	15.0% (6/40)	15.0% (6/40)	1.00

Functional outcomes are presented in Table 2. At 6 weeks, the operative group showed superior CMS (79.2 ± 8.5 vs. 64.8 ± 9.3, p<0.001) and lower DASH scores (21.5 ± 7.2 vs. 36.2 ± 9.0, p<0.001) [3, 4]. At 12 weeks, differences remained significant (CMS: 86.3 ± 7.7 vs. 77.9 ± 8.6, p=0.001; DASH: 14.8 ± 6.0 vs. 23.1 ± 7.5, p<0.001). By 24 weeks, outcomes were comparable (CMS: 89.8 ± 6.7 vs. 87.4 ± 7.2, p=0.21; DASH: 9.8 ± 5.0 vs. 11.7 ± 5.9, p=0.17).

Table 2: Functional outcomes at 6, 12, and 24 Weeks

Time Point	Outcome Measure	Conservative Group (n=40)	Operative Group (n=40)	p-value
6 Weeks	CMS (mean ± SD)	64.8 ± 9.3	79.2 ± 8.5	<0.001
	DASH (mean ± SD)	36.2 ± 9.0	21.5 ± 7.2	<0.001
12 Weeks	CMS (mean ± SD)	77.9 ± 8.6	86.3 ± 7.7	0.001
	DASH (mean ± SD)	23.1 ± 7.5	14.8 ± 6.0	<0.001
24 Weeks	CMS (mean ± SD)	87.4 ± 7.2	89.8 ± 6.7	0.21
	DASH (mean ± SD)	11.7 ± 5.9	9.8 ± 5.0	0.17

Radiological union data are shown in Table 3. The operative group achieved union faster (mean 10.2 ± 2.0 weeks vs. 14.5 ± 3.5 weeks, p<0.001). Non-union occurred in 4 patients (10%) in the conservative group and none in the operative group (p=0.04).

Table 3: Radiological union outcomes

Outcome	Conservative Group (n=40)	Operative Group (n=40)	p-value
Union Time (weeks, mean ± SD)	14.5 ± 3.5	10.2 ± 2.0	<0.001
Non-Union	10.0% (4/40)	0.0% (0/40)	0.04

Complications are summarized in Table 4. Complications were less frequent in the conservative group (15% vs. 22.5%, p=0.38). Malunion (10%) and shoulder stiffness (5%) were more common in the conservative group, while the operative group had superficial infections (7.5%), hardware irritation (10%), and one implant failure (2.5%).

Table 4: Complication rates in both groups

Complication	Conservative Group (n=40)	Operative Group (n=40)	p-value
Overall Complications	15.0% (6/40)	22.5% (9/40)	0.38
Malunion	10.0% (4/40)	0.0% (0/40)	0.04
Shoulder Stiffness	5.0% (2/40)	0.0% (0/40)	0.15
Superficial Infection	0.0% (0/40)	7.5% (3/40)	0.08
Hardware Irritation	0.0% (0/40)	10.0% (4/40)	0.04
Implant Failure	0.0% (0/40)	2.5% (1/40)	0.31

DISCUSSION

This retrospective study provides a comparative analysis of conservative and operative management for middle third clavicle fractures at Kathmandu Model Hospital, offering insights into treatment outcomes in a Nepalese tertiary care setting. The findings highlight distinct advantages and trade-offs, particularly relevant in resource-constrained environments where access to surgical expertise, post-operative care, and rehabilitation may be limited.

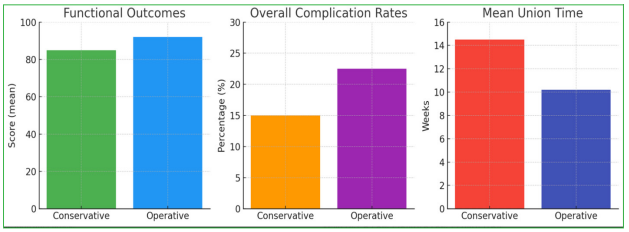

Figure 1: Functional outcomes, overall complication rates, mean union time between conservative and operative treatment.

The operative group demonstrated significantly better early functional outcomes, as evidenced by higher CMS and lower DASH scores at 6 and 12 weeks. This aligns with the Canadian Orthopaedic Trauma Society trial, which reported superior early function with plate fixation due to stable biomechanical constructs allowing early mobilization.[2] The ability to resume shoulder movement sooner likely contributed to reduced stiffness and improved patient satisfaction in the operative group.[5] By 24 weeks, both groups achieved comparable functional outcomes, suggesting that conservative management may suffice for patients prioritizing long-term recovery over rapid return to function. This convergence may reflect the clavicle's robust healing potential when adequately aligned, even without surgical intervention.[6,7] In Nepal, where many patients are manual laborers or live in rural areas with limited access to follow-up care, the choice of early functional recovery via surgery may be critical for maintaining livelihoods. However, the risks of surgical complications must be carefully weighed, particularly in settings with variable access to post-operative care.[8]

The faster radiological union in the operative group (10.2 weeks vs. 14.5 weeks) underscores the biomechanical advantage of fixation, which minimizes fracture movement and promotes primary bone healing.[9] Conversely, the conservative group's higher non-union rate (10%) and malunion incidence (10%) highlight the challenges of maintaining fracture alignment with immobilization alone, particularly in displaced fractures.[10] Patient-specific factors, such as compliance with immobilization protocols, play a critical role in conservative outcomes. In a setting like Kathmandu Model Hospital, where patients may not adhere to prolonged immobilization due to socio-economic pressures, these complications can lead to

functional deficits, such as reduced shoulder strength or cosmetic deformity. However, the operative group's benefits come with caveats, as surgical fixation introduces risks like hardware irritation, which affected 10% of patients, potentially requiring secondary surgeries for implant removal—a significant concern in resource-limited settings.[11,12]

The conservative group had a lower overall complication rate (15% vs. 22.5%), primarily due to the absence of surgery-related issues like infection or hardware failure. Superficial infections in the operative group (7.5%) were manageable with antibiotics, but their occurrence highlights the importance of sterile surgical environments, which may be challenging in busy hospitals like Kathmandu Model Hospital. Hardware irritation, a common issue with plate fixation, was reported in 10% of operative cases, often necessitating patient counseling about potential implant removal.[13,] In contrast, conservative management's complications, such as malunion and shoulder stiffness, were less invasive but could still impact long-term function, particularly in younger, active patients.[14,15] These findings suggest that while conservative treatment minimizes immediate risks, it may not be ideal for all patients, especially those with significantly displaced fractures or high functional demands.

The choice between conservative and operative management in Nepal is influenced by unique socio-economic and healthcare factors.[16] Kathmandu Model Hospital serves a diverse population, including urban and rural patients with varying access to resources. Operative management requires specialized surgical skills, advanced equipment, and robust post-operative care, which may strain hospital resources. Additionally, the cost of surgery, including implants and hospital stays, can be prohibitive for uninsured patients, making conservative management more accessible. However, prolonged immobilization in the conservative approach may lead to lost wages for manual laborers, a significant concern in Nepal's economy. Patient-specific factors, such as occupational demands and access to follow-up care, are critical in treatment decisions.[17] The study's findings suggest that operative management may be prioritized for patients with displaced fractures or those requiring rapid return to work, while conservative management could be reserved for less displaced fractures or patients with limited surgical access.

Globally, the trend has shifted toward operative management for displaced middle third clavicle fractures, driven by studies demonstrating lower non-union rates and better early function.[2,9,14] However, in resource-limited settings, conservative management remains prevalent due to cost and infrastructure constraints. This study's results partially align with global trends but highlight the need for tailored guidelines in Nepal. For instance, while the operative group's outcomes mirror those in high-resource settings, the complication profile (e.g., infections) reflects challenges in post-operative care.[18] Patient-specific factors, such as activity level and fracture characteristics, further complicate treatment decisions.[19,20] Future research in Nepal should explore hybrid protocols, such as selective operative intervention for high-risk fractures, to balance outcomes and resource utilization. The study did not assess long-term outcomes beyond 24 weeks, limiting insights into chronic complications like implant-related issues or late malunion effects. Additionally, cost-effectiveness, a critical factor in Nepal, was not evaluated. Future studies should incorporate prospective designs, longer follow-up, and economic analyses to better inform treatment protocols.

CONCLUSION

Operative management of middle third clavicle fractures offers faster union and better early functional outcomes, but compared to conservative management it has higher complication rate. Conservative treatment remains a safer, more accessible option for patients with limited resources, though it risks delayed recovery and malunion. These findings underscore the need for individualized treatment plans, considering patient-specific factors, fracture characteristics, and healthcare infrastructure.

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