

LATERAL THIRD CLAVICLE FRACTURE MANAGED BY HOOK PLATE IN A TERTIARY CARE HOSPITAL IN NORTH-EAST INDIA: A PROSPECTIVE STUDY

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ABSTRACT

Background: Lateral third clavicle fractures are challenging due to the high incidence of nonunion and displacement. The clavicular hook plate has emerged as an effective method for fixation, providing stable reduction and early mobilization. **Objective:** To evaluate the functional outcomes of lateral third clavicle fractures managed with a clavicle hook plate and assess associated complications over one year. **Materials and Methods:** A prospective study was conducted on 40 patients with lateral third clavicle fractures treated with a clavicular hook plate from January 2023 to December 2023. Functional outcomes were assessed using the Constant-Murley score at 3, 6, and 12 months. Complications were recorded. **Result:** All fractures achieved union at an average of 12.5 weeks. The mean Constant-Murley score at 12 months was 92.5 ± 5.1 , indicating excellent functional recovery. One patient developed a superficial skin infection who was managed successfully with oral antibiotics. No cases of nonunion, implant failure or acromioclavicular arthritis were observed. Mild restriction of shoulder abduction was observed in 5% of cases, which improved with physiotherapy and implant removal after union. **Conclusion:** Clavicle hook plate fixation provides reliable anatomical reduction and excellent functional outcomes for lateral third clavicle fractures, with minimal complications.

INTRODUCTION

Fractures of the lateral third of the clavicle amount for 10–15% of all clavicular fractures.^[1] These fractures are often unstable because of the detachment of the coracoclavicular ligaments, increasing the risk of nonunion and malunion.^[2,3] Traditional conservative management has shown variable outcomes.^[4] Surgical fixation using the clavicle hook plate offers rigid fixation, early mobilization and good functional outcomes.^[5,6] Recent studies highlight the success of the hook plate in maintaining anatomical reduction and minimizing complications such as nonunion, malunion, and delayed union.^[6-8] The present study was done to evaluate the functional outcomes of lateral third clavicle fractures managed with a clavicle hook plate and assess associated complications over one year period.

MATERIALS AND METHODS

This prospective, observational study was conducted on 60 pregnant women beyond 28 weeks of gestation

at the Department of Obstetrics and Gynaecology, Madurai Medical College, over one year. This study was carried out after the approval of the Institutional Ethical Committee (Reference number-3374/IEC/2024-13). Informed and written consent was obtained from all the patients.

Inclusion Criteria

Pregnant women beyond 28 weeks of gestation who were multiparous, had a previous history of placenta previa, previous caesarean section, recurrent pregnancy loss, or conception through assisted reproductive technology (ART). Only patients with stable vital signs and those who provided informed consent were included in the study.

Exclusion Criteria

Women < 20 years or > 45 years of age, those with gestational age < 28 weeks, or with a known bleeding disorder or coagulopathy, not willing to provide informed consent were excluded.

Methods

Detailed clinical history, thorough physical examination, and antenatal ultrasonography were performed. Each patient's history included obstetric background, previous uterine surgeries, parity, and

known risk factors, such as prior caesarean section, high parity, increasing maternal age, and multifetal gestation. Patients underwent ultrasonography (USG) of the abdomen and pelvis to determine the location of the placenta and assess foetal well-being. MRI was performed to further evaluate placental attachment and invasion. Routine laboratory investigations, including Complete Blood Count (CBC), random blood sugar, Renal Function Test (RFT), Liver Function Test (LFT), and serum electrolytes, were carried out. Data were presented as frequencies and percentages.



Figure 1: The intervention

Postoperative Protocol: Pendulum exercises were started from post-operative day 2. Active-assisted shoulder movements were initiated at 2 weeks and full range of motion was started at six weeks. Only descriptive analysis was done. Ethical approval for the study was obtained from the Institutional Ethics Committee of JNIMS.

RESULTS

Completed data sets could be collected from 40 study participants. The demographic profile of the 40 patients included in this study is shown below. The majority of patients were in the 31–40 years age group (35%), followed by 21–30 years (30%), indicating a higher incidence among young and active adults. Males were predominantly affected (75%) compared to females (25%) (Table 1). Majority of the patients (26; 65%) had the fracture on the right side whereas the remaining 14 (35%) had it on the left side.

Table 1: Age distributions of the patients

Age Group (yrs.)	Number of Patients (%)
21–30	12 (30)
31–40	14 (35)
41–50	8 (20)
51–60	4 (10)
>60	2 (5)

Table 2: Table showing mode of injury

Mode of injury	No. of patients (%)
Road traffic accident (RTA)	26 (65.0)
Fall from height	06 (15.0)
Direct blow to shoulder	05 (12.5)
Fall on outstretched hand (FOOSH)	03 (7.50)

In our study, road traffic accidents were the leading cause of lateral third clavicle fractures, accounting for 65% of cases, followed by falls from height (15%) and direct shoulder impact injuries (12.5%). Only 7.5% resulted from a fall on an outstretched hand (FOOSH), indicating that indirect trauma contributes minimally to lateral clavicle fractures (Table 2). There were associated injuries in five patients (3 with rib fracture and 2 with scapular fracture).

Comorbidities were also seen in seven patients (4 with diabetes mellitus and 3 with hypertension).

All the 40 patients achieved union in the mean duration (SD) of 12.5 (1.8) weeks. There were some complications in six patients, the details of which are given in Table 3. Paresthesia due to supraclavicular nerve irritation, restricted shoulder movement and superficial infections were found in them.

Table 3: Complications seen during follow up

Types of complications	No. of patients (%)
Restricted shoulder abduction ($>20^\circ$)	2 (5.0)
Paresthesia due to supraclavicular nerve irritation	3 (7.5)
Superficial infection (resolved)	1 (2.5)

In terms of functional outcome measured by Constant-Murley Score, at the end of three months, it

was graded as good and by the end of six and 12 months, it was excellent. [Table 4]

Table 4: Functional Outcome (Constant-Murley Score)

Time (Months)	Constant-Murley score (SD)	Functional outcome
3	78.2 (6.3)	Good
6	88.6 (5.7)	Excellent
12	92.5 (5.1)	Excellent



Figures showing functional outcomes of patient on follow-up examinations

DISCUSSION

Lateral third clavicle fractures pose a unique surgical challenge due to the small distal fragment and disruption of coracoclavicular ligaments, predisposing to high rates of nonunion. The clavicle hook plate offers a biomechanically stable fixation that restores the coracoclavicular relationship and allows early shoulder mobilization.

In our study, the demographic distribution revealed a predominance of males (75%) and injuries on the right side (65%), similar to findings by Cho et al. (2020),^[1] and Sharma et al. (2023).^[9] This may be attributed to increased involvement of males in outdoor physical activities and right-hand dominance, making the right clavicle more prone to injury. The peak incidence in the 31–40 years age group corresponds with the most active phase of life, where individuals are more exposed to vehicular and occupational trauma. The most common mechanism of injury in our series was road traffic accidents (65%). This was in accordance with findings of Lee et al. (2021),^[3] and Patel et al. (2024),^[10] highlighting the increasing burden of high-energy trauma. The relatively low proportion of FOOSH-related injuries is consistent with biomechanical studies suggesting

that lateral third fractures usually result from direct trauma rather than transmitted force along the upper limb.^[1,3,9,10] Associated injuries such as rib and scapular fractures were seen in 12.5% of patients, similar to other series.^[9,11] The presence of comorbidities like diabetes and hypertension (17.5%) did not significantly affect union rates, as meticulous perioperative management was done.

In the present study of 40 patients, all fractures achieved union with a 100% union rate and a mean union time of 12.5 ± 1.8 weeks. The average Constant-Murley score improved from 78.2 at 3 months to 92.5 at 12 months, demonstrating excellent functional recovery. These results are consistent with Cho et al. (2020) and Lee et al. (2021), who reported union rates of 95–98% and similar improvements in shoulder function following hook plate fixation.^[1,3] Our results reaffirm that clavicle hook plate fixation offers predictable union and functional outcomes even in patients with minor comorbidities, provided proper surgical technique and postoperative physiotherapy are followed.^[11,12] These functions are consistent with Rockwood and Green and Campbell who emphasize correct plate contouring and early implant removal to avoid acromioclavicular irritation and improving outcome.^[11,12]

Mild restriction of shoulder abduction was observed in 5% of cases, which improved with physiotherapy and implant removal after union. Paresthesia over the anterior chest wall due to supraclavicular nerve irritation occurred in 7.5% of cases and resolved spontaneously within three months of follow-up and 2.5% cases have superficial infection which resolved after oral antibiotics. These findings are consistent with Zhang et al (2022),^[8] Sharma et al (2023),^[9] and Rockwood and Green (2020),^[11] who reported transient nerve symptoms in 5–10% of hook plate fixation cases, usually improving after implant removal and rehabilitation.

There was one superficial skin infection which resolved with oral antibiotics. No implant failure, nonunion or acromioclavicular arthritis was observed.

The hook plate's main limitation is subacromial irritation, which can cause transient impingement; however, in this study, careful plate contouring and timely removal after fracture union prevented long-term discomfort. Rockwood and Green (2020) and Campbell (2021) emphasize the importance of anatomical plate fitting and early implant removal to reduce acromioclavicular irritation.^[11,12] Compared to alternative fixation methods such as K-wire or locking plates, hook plate fixation offers superior mechanical stability, higher union rates, and fewer complications, as supported by Li et al. (2025) and Subramanian et al. (2020).^[5,13] We did not find any hypertrophied scar in our study which may be due to meticulous wound closer in layers.

Limitations: The small sample size, being a single-centered study, and short-term follow-up were the main limitations of the study. Long-term implant-

related complications like acromioclavicular arthritis require further evaluation.

CONCLUSION

Our findings confirm that hook plate fixation is a reliable and reproducible method for unstable lateral clavicle fractures, ensuring high union rates, rapid functional recovery and minimal complications when combined with proper technique and postoperative rehabilitation.

Clavicle hook plate fixation is a safe and effective method for managing lateral third clavicle fractures. It ensures anatomical reduction, early mobilization, excellent functional outcomes and a low complication rate.

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