



## Comparative Evaluation of Functional Outcomes in Lateral End Clavicle Fractures Managed with Endobutton Versus Other Modalities

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### Abstract

**Background:** Lateral end clavicle fractures risk non-union and dysfunction; Endobutton fixation offers coracoclavicular stabilization. This study compares Endobutton with other techniques for fracture healing and postoperative shoulder function using validated scores.

**Objectives:** To assess and compare clinical and radiological union of lateral end clavicle fractures treated with Endobutton versus other fixation methods, and to evaluate postoperative shoulder function through range of motion and validated ASES scores at defined follow-up intervals.

**Methods:** A randomized trial of 50 patients (18–60 years) with lateral clavicle fractures compared Endobutton and other methods, assessing union times, ASES scores, and complications; analysis used SPSS v26 with  $p < 0.05$ .

**Results:** Endobutton achieved earlier clinical and radiological union, superior ASES scores at 6, 12, and 24 weeks, and fewer complications compared to other modalities, where hardware failure and nerve injury were exclusively observed.

**Conclusion:** Endobutton fixation provides faster union, superior functional and radiological outcomes, and fewer complications than other methods, making it a reliable treatment for lateral clavicle fractures; larger studies are needed for confirmation.

**Keywords:** Lateral end clavicle fracture, Endobutton fixation, Fracture union, Functional outcome, ASES score

### Introduction

The clavicle, an essential component of the shoulder girdle, plays a vital role in maintaining upper limb stability and transmitting forces from the upper extremity to the axial skeleton. Its lateral end is anatomically predisposed to fractures because of the unique ligamentous attachments and exposure to high-energy trauma. Lateral end clavicle fractures constitute nearly 10–25% of all clavicular injuries and are associated with significant functional compromise due to their instability and high non-union rates [1].

Multiple classifications, including Neer's system, categorize lateral end clavicle fractures into stable and unstable variants, the latter often requiring surgical intervention [2]. These fractures are especially common in younger, active adults and elderly

populations prone to falls, thereby contributing substantially to morbidity. Globally, distal clavicle fractures account for 15–20% of all clavicle fractures, and in India, their incidence is increasing with rising road traffic accidents and sports-related injuries [3].

The clinical relevance lies in the fact that untreated or inadequately treated unstable fractures may lead to chronic pain, shoulder weakness, deformity, and reduced range of motion [4]. From a socioeconomic standpoint, prolonged disability can impair productivity in working-age adults and delay return to activity in athletes. Although conservative treatment is reserved for stable variants, surgical management remains the standard of care for displaced and unstable patterns [5].

Various surgical techniques have been proposed, including hook plates, locking plates, tightrope devices, and Endobutton fixation, each with distinct advantages and drawbacks [6]. While hook plates and locking plates ensure rigid fixation, complications such as subacromial impingement, implant irritation, and need for removal are well recognized [7]. Endobutton techniques, by contrast, aim to provide stable fixation with minimal hardware-related complications, enabling faster rehabilitation and superior functional recovery [1,2].

### Materials And Methods

**Place of Study:** The study was conducted at Moti Lal Nehru Medical College and SRN Hospital, Prayagraj, a tertiary care centre, after obtaining ethical committee approval from M.L.N. Medical College.

**Type of Study:** Randomized control trial.

**Sample Size:** 50 (25 in each group).

### Inclusion Criteria

1. Patients with lateral end clavicle fracture
2. Patients with an age group of 18 -60 years.

### Exclusion Criteria

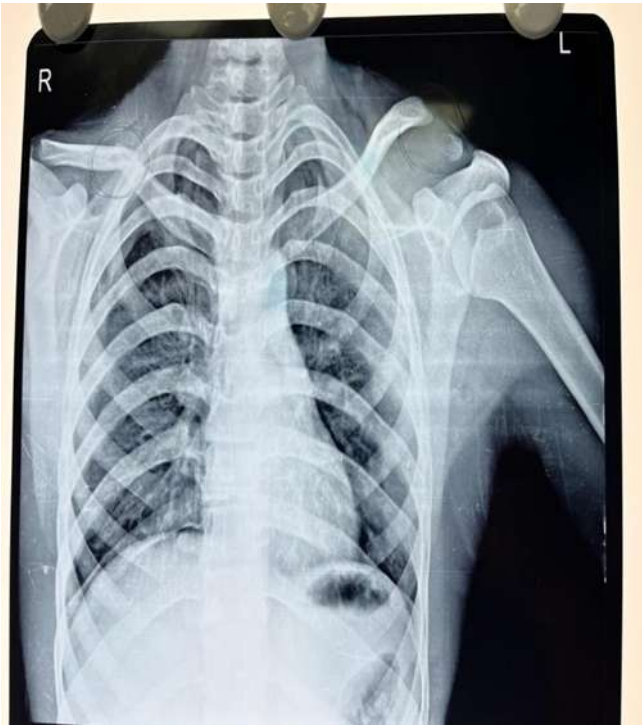
1. Patients of age less than 18 years and more than 60 years.
2. Patients who had open fractures
3. Patients who had associated brachial plexus injury
4. Severely ill patients

### Statistical Analysis:

Data were analyzed using SPSS v26. Means ( $\pm$ SD) were compared using Student's t-test; p-value  $<0.05/0.001$  was significant.

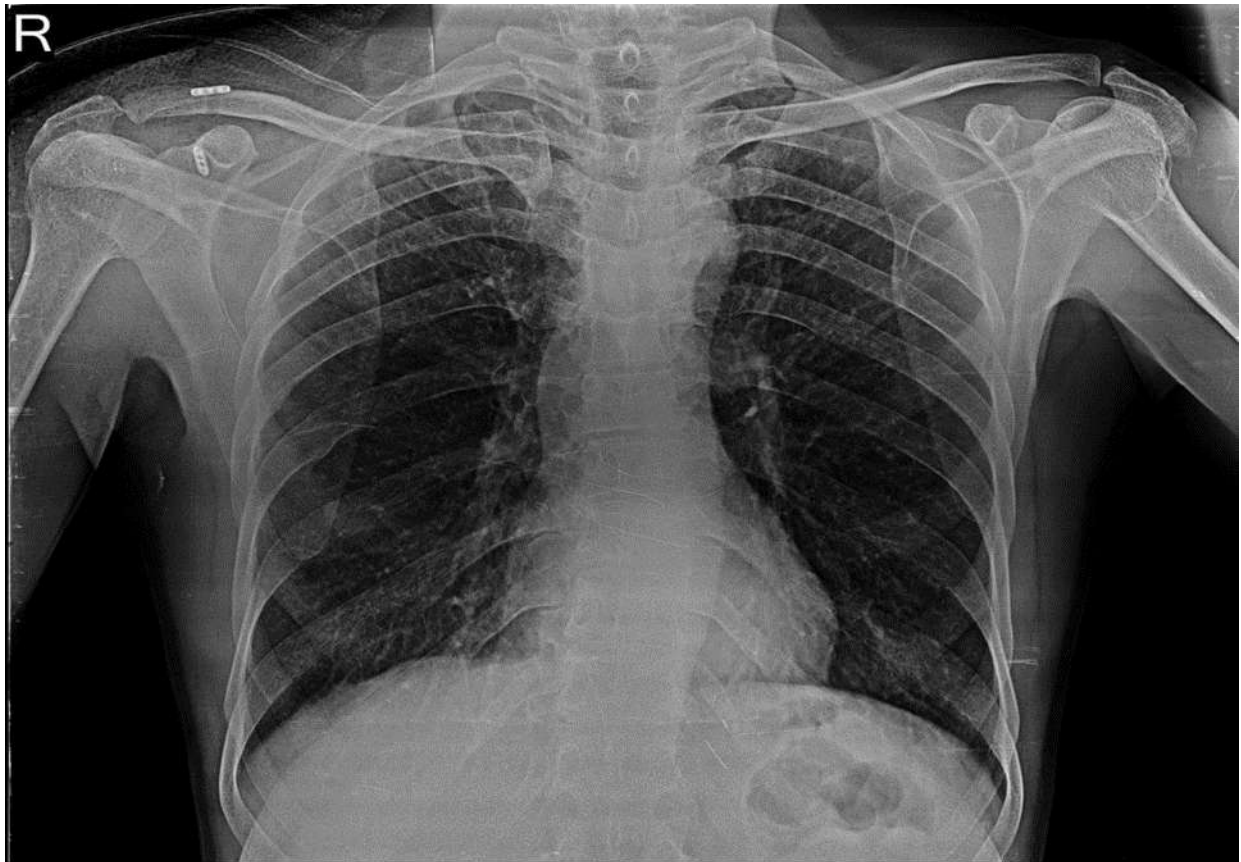
### Pre Operative

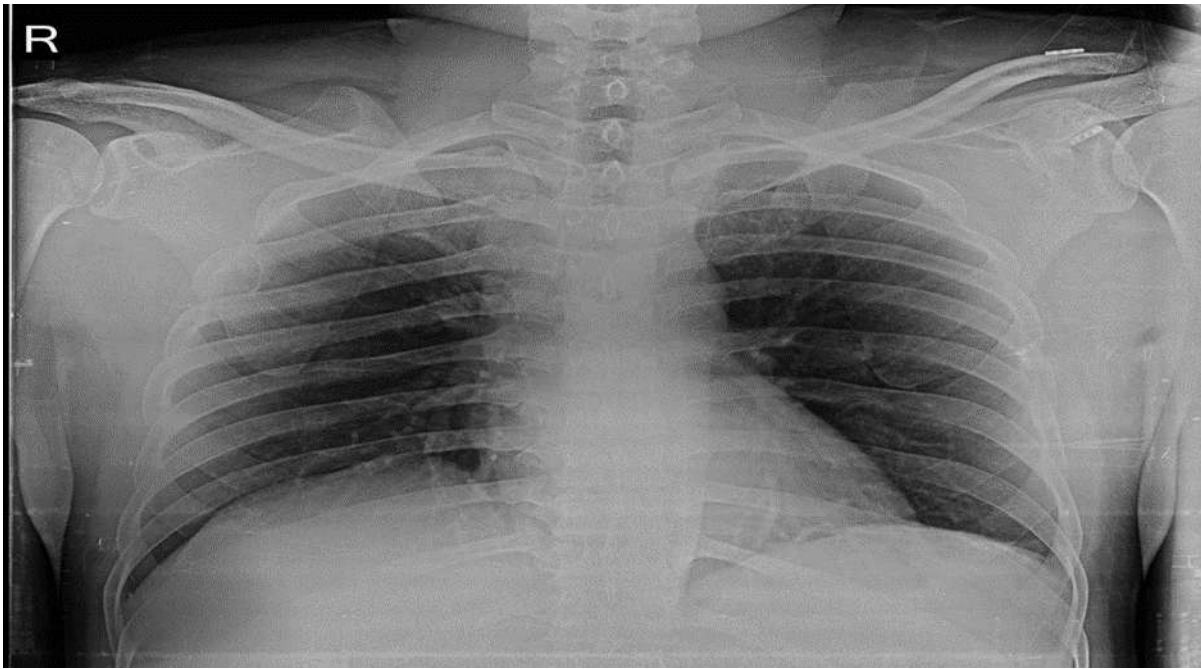




**Intra operative**







**Post Operative**

**Results**

In this study, mean age was  $35.42 \pm 8.67$  years in Endobutton group and  $36.93 \pm 7.85$  years in Other modalities ( $p=0.522$ ). Gender distribution: males 68% vs 76%, females 32% vs 24% ( $p=0.753$ ).

**Table 1 : Clinical Characteristics of enrolled patients managed by Endobutton Vs. Other Modalities**

Parameter	Endobutton Group (n=25)	Other Modalities Group (n=25)	p-value
Mechanism of Injury			
Fall	9 (36.0%)	12 (48.0%)	$\chi^2=0.832,$ $p=0.660$
Direct Blow	10 (40.0%)	7 (28.0%)	
Sports Injury	6 (24.0%)	6 (24.0%)	
Side of Fracture			
Left	12 (48.0%)	13 (52.0%)	$\chi^2=0.080,$ $p=0.777$
Right	13 (52.0%)	12 (48.0%)	

Bilateral	0 (0.0%)	0 (0.0%)	
Displacement			
No Displacement	6 (24.0%)	7 (28.0%)	$\chi^2=0.084,$ $p=0.959$
Displaced	14 (56.0%)	13 (52.0%)	
Comminuted	5 (20.0%)	5 (20.0%)	

Table 1 represents that Injury mechanisms were similar between groups, with falls (36% vs. 48%), direct blows (40% vs. 28%), and sports injuries (24% each). Left- and right-sided fractures were nearly equal, with no bilateral cases. Displacement patterns (non-displaced 24% vs. 28%, displaced 56% vs. 52%, comminuted 20% each) showed no significant differences ( $p>0.05$ ).

**Figure 1 : Graphical representations of Fracture Union Assessment (Clinical and Radiological) of enrolled patients managed by Endobutton Vs. Other Modalities**

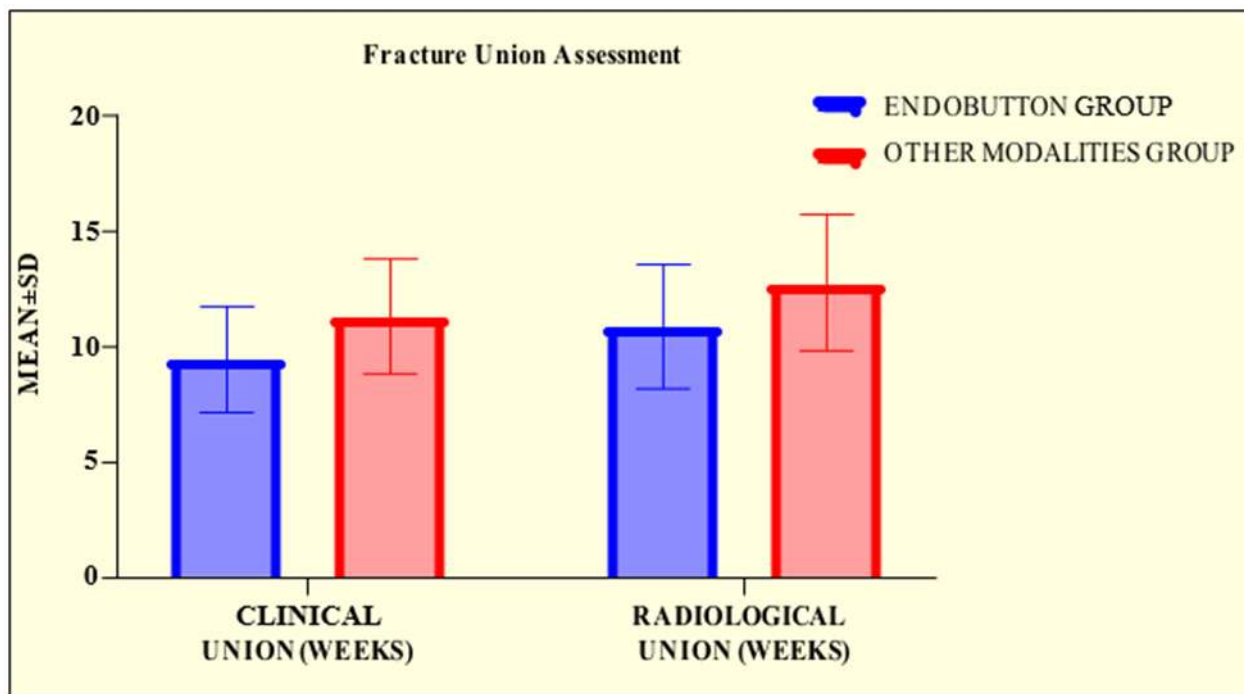


Figure 1 shows the mean clinical union was achieved earlier in the Endobutton group ( $9.42 \pm 2.31$  weeks) compared to the Other Modalities group ( $11.15 \pm 2.48$  weeks), with a significant difference ( $p=0.014$ ). Radiological union was also earlier with Endobutton ( $10.85 \pm 2.72$  weeks vs.  $12.72 \pm 2.94$  weeks,  $p=0.024$ ). Delayed union occurred in 1 case (4.0%) with Endobutton and 2 cases (8.0%) with Other Modalities, showing no significant difference ( $p=0.5515$ ).

**Figure 2 : Graphical representations of ASES Score Follow-up of enrolled patients managed by Endobutton Vs. Other Modalities.**

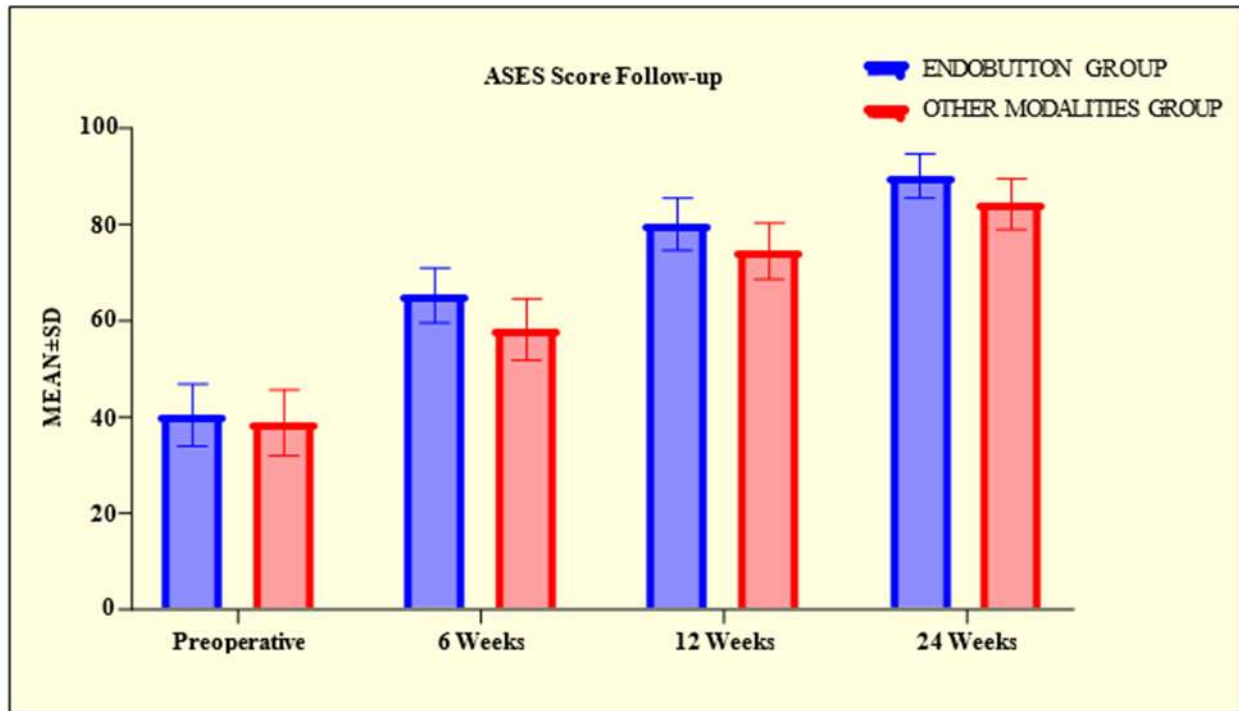
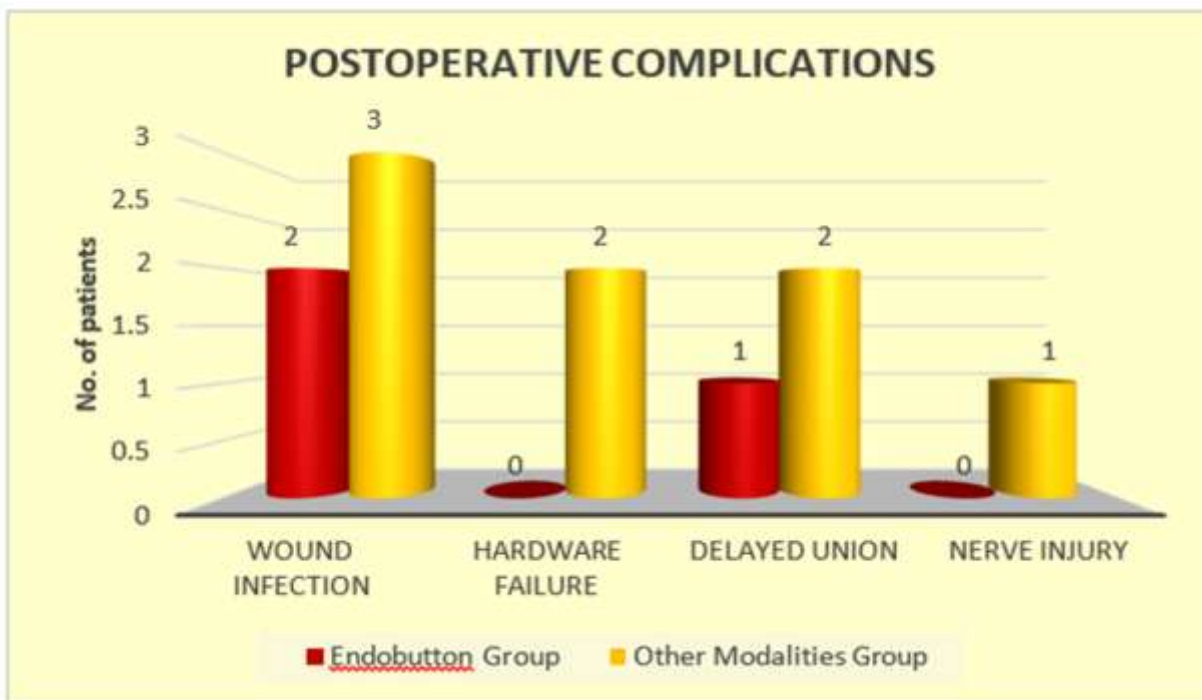


Figure 2 represents preoperatively, mean ASES scores were comparable between Endobutton ( $40.36 \pm 6.47$ ) and Other Modalities ( $38.72 \pm 6.89$ ,  $p=0.390$ ). At 6 weeks, scores improved significantly with Endobutton ( $65.28 \pm 5.72$  vs.  $58.15 \pm 6.38$ ,  $p<0.0001$ ). This advantage persisted at 12 weeks ( $80.12 \pm 5.45$  vs.  $74.47 \pm 5.83$ ,  $p<0.0001$ ) and 24 weeks ( $90.15 \pm 4.62$  vs.  $84.28 \pm 5.31$ ,  $p<0.0001$ ).

**Figure 3: Graphical representations of Postoperative Complications and Recovery Outcomes of enrolled patients managed by Endobutton Vs. Other Modalities.**



In Figure 3, Wound infection occurred in 2 patients (8.32%) in the Endobutton group and 3 patients (12.45%) in the Other Modalities group ( $p=0.637$ ). Hardware failure was seen only in the Other Modalities group (7.82%), with no cases in Endobutton ( $p=0.1489$ ). Delayed union was reported in 1 case (4.0%) with Endobutton and 2 cases (8.0%) with Other Modalities ( $p=0.5515$ ). Nerve injury occurred in 1 patient (3.94%) in the Other Modalities group, with none in Endobutton ( $p=0.3124$ ).

### Discussion

In the present study, the mean age was  $35.42 \pm 8.67$  years in the Endobutton group and  $36.93 \pm 7.85$  years in the Other modalities group ( $p=0.522$ ), with a male predominance of 68% and 76% respectively, which is comparable to the male dominance reported by Kumar MK, Mylarappa A (2024). [1] Mechanisms of injury were mainly falls (36% vs 48%), direct blows (40% vs 28%), and sports injuries (24% each), closely resembling the pattern reported by Lingaraju *et al.* (2024) [2] who highlighted trauma and falls as leading causes. Fracture characteristics revealed non-displaced (24% vs 28%), displaced (56% vs 52%), and comminuted (20% each), which aligns with Malik *et al.* (2023) [3] where displaced fractures were most

frequent. Clinical union occurred earlier with Endobutton ( $9.42 \pm 2.31$  weeks) than Other modalities ( $11.15 \pm 2.48$  weeks,  $p=0.014$ ), with radiological union also faster ( $10.85 \pm 2.72$  vs  $12.72 \pm 2.94$  weeks,  $p=0.024$ ), consistent with Yagnik *et al.* (2021) [6] who reported early union with cortical button fixation. Functional outcomes showed significant improvement in ASES scores at 6 weeks ( $65.28 \pm 5.72$  vs  $58.15 \pm 6.38$ ), 12 weeks ( $80.12 \pm 5.45$  vs  $74.47 \pm 5.83$ ), and 24 weeks ( $90.15 \pm 4.62$  vs  $84.28 \pm 5.31$ , all  $p<0.0001$ ), findings comparable to Karuppaiah *et al.* (2022) [4] who demonstrated excellent ASES recovery with augmentation techniques. Complications included wound infection (8.32% vs 12.45%), hardware failure only in Other modalities (7.82%), delayed union (4% vs 8%), and nerve injury (3.94% in Other modalities), which agrees with Ochen *et al.* (2019) [7] who noted higher implant-related issues with hook plates. Collectively, the study emphasizes that Endobutton fixation achieves earlier union, better functional outcomes, and fewer complications compared to other methods.

### Conclusion

In this randomized trial of 50 patients with lateral end clavicle fractures, baseline characteristics including

age ( $35.42 \pm 8.67$  vs  $36.93 \pm 7.85$  years,  $p=0.522$ ), gender distribution (males 68% vs 76%,  $p=0.753$ ), injury mechanisms, and fracture patterns were comparable across groups. Endobutton fixation achieved significantly earlier clinical union ( $9.42 \pm 2.31$  vs  $11.15 \pm 2.48$  weeks,  $p=0.014$ ) and radiological union ( $10.85 \pm 2.72$  vs  $12.72 \pm 2.94$  weeks,  $p=0.024$ ). Functional recovery was superior with Endobutton at 6, 12, and 24 weeks (ASES 65.28, 80.12, 90.15 vs 58.15, 74.47, 84.28; all  $p<0.0001$ ). Complications were lower, with hardware failure and nerve injury limited to Other modalities.

## References

1. Kumar MK, Mylarappa A. A Comparative Study on Fixation of Unstable Lateral End Clavicle Fractures with Tightrope and Endobutton by Transcoracoid and Subcoracoid Cerclage Techniques. *Journal of Orthopaedics, Traumatology and Rehabilitation*. 2024 Jul 1;16(2):107-12.
2. Lingaraju K, Chand ME, Kashikar G. Functional Outcome of Lateral End Clavicle Fractures Treated with Precontoured Lateral End Clavicle Plates Verses Clavicle Hook Plate—A Comparative Study. *Journal of Orthopaedics, Traumatology and Rehabilitation*. 2024 Jul 1;16(2):158-62.
3. Malik SS, Tahir M, Remtulla M, Malik S, Jordan RW. A systematic review and meta-analysis comparing the use of hook plates and superior plates in the treatment of displaced distal clavicle fractures. *Archives of orthopaedic and trauma surgery*. 2023 Jan;143(1):329-52.
4. Karuppaiah K, Bilal A, Colegate-Stone T, Sinha J, Tahmassebi R, Tavakkolizadeh A. Outcome following management of unstable lateral end clavicle fractures with locking plate and coracoid anchor augmentation. *Shoulder & Elbow*. 2022 Apr;14(2):181-8.
5. Martin JR, Saunders PE, Phillips M, Mitchell SM, Mckee MD, Schemitsch EH, Dehghan N. Comparative effectiveness of treatment options for displaced midshaft clavicle fractures: a systematic review and network meta-analysis. *Bone & Joint Open*. 2021 Aug 16;2(8):646-54.
6. Yagnik GP, Seiler JR, Vargas LA, Saxena A, Narvel RI, Hassan R. Outcomes of arthroscopic fixation of unstable distal clavicle fractures: a systematic review. *Orthopaedic Journal of Sports Medicine*. 2021 Apr 28;9(5):23259671211001773.
7. Ochen Y, Frima H, Houwert RM, Heng M, van Heijl M, Verleisdonk EJ, van der Velde D. Surgical treatment of Neer type II and type V lateral clavicular fractures: comparison of hook plate versus superior plate with lateral extension: a retrospective cohort study. *European Journal of Orthopaedic Surgery & Traumatology*. 2019 Jul 1;29(5):989-97.