



Functional and Radiological Evaluation of Displaced Lateral End Clavicle Fractures Treated with Locking Plating

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Abstract

Clavicle fractures represented 2.6% to 4% of all fractures and 44% of those in the shoulder girdle among adults and 10-15% in children involve the clavicle, lateral-end in 12-26% of patients. Understanding the displacement of clavicle fractures necessitates a thorough understanding of the numerous muscular and ligamentous forces operating on the clavicle bone. Particular fracture patterns frequently result in issues if they are not surgically corrected and managed. The distal end is the second most prevalent location for clavicle fractures after the midshaft⁵. Because of the forces that are displacing the fracture fragments, 25% of distal clavicle fractures are unstable. For the treatment of lateral end clavicle fractures, a variety of surgical

treatment techniques have been tested, including: Coracoclavicular screws, Kirschner wires, Tension bands, Hook plates, Nonlocked and locked plates.⁹

Material & Methods: We have done 33 cases of Displaced Lateral End Clavicle Fractures treated with Open Reduction and Internal Fixation with Locking Plate and Screws at GSL medical college between Jan 2023 to Jan 2024. Cases were followed up for a period of 1 year and have been evaluated based on Constant and Murley score.

Results: In our study, all 33 patients have completed follow up for 1 year (27 males, 6 female). At final follow up 7 patients received excellent scores, while 21 patients had good scores.

Conclusion: Pre-contoured locking compression plates are a safer choice for treating lateral end clavicle fractures because they don't need to be bent during surgery, reducing overall recovery time. Further, as they are locking constructs they have good angular stability and also have very good purchase in porotic bones.

Keywords: Clavicle fractures, Shoulder joint, Kirschner wires, Hook plates

Introduction

Clavicle fractures are the most common injuries in young, active individuals, especially in those who participate in activities or sports where high-speed falls (bicycling, motorcycles) or violent collisions (football, hockey) are frequent, and they account for 2.6% of all fractures. The commonly used system of classification is that of Allman. It is divided into three groups. Group I: Middle-third fractures, Group II: Lateral-third fractures, Group III: Medial- third fractures. Because of the forces that are displacing the fracture fragments, 25% of distal clavicle fractures are unstable. a superior force applied to the medial clavicle fracture fragment and inferior force applied to the lateral clavicle fracture fragment. Using Neer's Classification, these fractures can be classified. The distal fractured fragment is tiny, making it challenging to achieve an anatomical reduction and creating issues with its fixation, leading to instability of lateral clavicle fractures. In this study, we are going to evaluate the functional and radiological outcomes of the patients in whom a locking plate is used for fixation of the lateral end of clavicle fractures.

Objectives

➤ To assess the range of motion of the shoulder joint after surgical management of displaced lateral end clavicle fractures among adults.

- To assess the radiological union of fracture after internal fixation.
- Early mobilization of the shoulder joint.

Material and Methods

We have done 33 cases of Displaced Lateral End Clavicle Fractures treated with Open Reduction and Internal Fixation with Locking Plate and Screws at GSL medical college between Jan 2023 to Jan 2024. Cases were followed up for a period of 1 year and have been evaluated based on Constant and murley score. After taking consent from the patients, under general anaesthesia, in supine position with a roll of a blanket between scapula to retract the clavicle and in beach chair position with the injured arm in a mobile position. To get a clear view of surgical site, the patient's head was turned towards the opposite side. fracture was centred by making a horizontal incision across the upper clavicle. supraclavicular nerves were then taken care of using subcutaneous dissection. clavicle was exposed by division of platysma. With the help of a short-term Kirschner wire fixation, the reduction was achieved and kept (Fig. The fracture was fixed with a precontoured lateral clavicle locking plate, using 3.5 mm locking and cortical screws on the medial side and 2.7 mm locking screws on the lateral side. The wound closure was done layer after layer. Post-operatively the arm was immobilized with the help of an arm pouch.



Figure 1:



Figure 2:



Figure 3:



Figure 4:

Post operatively Wound dressing was done regularly at 2nd, 5th and 10th post-op day, Staple removal was done on the tenth postop day. Rehabilitation was started with shoulder exercises at 2 weeks postoperatively. In arm pouch, gentle pendulum exercise to the shoulder were permitted. Gentle active range of motion(ROM) of the shoulder was permitted at 4 to 6 weeks, although abduction was restricted to 80°. Active ROM in all the planes was allowed at 6-8 weeks. Regular follow up follow up at 6weeks, 12weeks and at 6months was done.

Results

In our study, all 33 patients have completed follow up for 1 year. Out of the 33 cases, 27 cases were male (81.8%) and 6 cases were female (18.2%) .There were 7 cases (21.2%) with an excellent functional score, 21cases (63.7%) with good functional score and 5 cases with a fair score (15.1%).Complications were Shoulder stiffness in 2 (6%) patients, Plate prominence in 1(3%), Delayed union in 1(3%) patients

Table 1:

| No. Of patients | Pre-OP C-M Score | C-M Score | Outcome |
|-----------------|------------------|-----------|-----------|
| 7 | 88 | 92 | Excellent |
| 5 | 77 | 80 | Good |
| 21 | 72 | 77 | Fair |

Discussion

In cases with lateral third clavicle fractures, it is challenging to accomplish secure fixation due to the small distal fragment and increased deforming stresses. It is currently unclear how to treat these fractures most effectively. K wire fixation, tension band wiring, screw fixation, locking and non-locking plates, and hook plates are some of the available modalities. The current study employs multiplanar screw fixation with a pre-contoured locking compression plate with a broad lateral end to achieve stability in the distal fragment. Anatomical fit is made possible by the precontouring. The pull-out strength of six screws located in various directions is increased, and thanks to their locking mechanism, they do not need to be engaged in the opposite cortex. The locking mechanism helps treat the osteoporotic fractures. Therefore, achieving good union of the lateral third of clavicle fractures is quite beneficial. Even in osteoporotic bone, stable fixation and early post-operative shoulder mobility are possible without engaging the acromio-clavicular (AC) joint or subacromial region. There are much fewer complications including fixation failures, iatrogenic rotator cuff injuries, AC joint osteoarthritis, and sub-acromial bursitis. Because there is no stress riser at the medial end of the clavicle in this procedure, the stress fracture of the clavicle is less compared to hook plate fixation. The lateral end of the clavicle's relatively thick muscles and low profile design.



Conclusion

Pre-contoured locking compression plates are a safer choice for treating lateral end clavicle fractures because they don't need to be bent during surgery, reducing overall recovery time. The risk associated with the bulkier implants is not seen with these implants as they have a low profile. Further, as they are locking constructs they have good angular stability and also have very good purchase in porotic bones.

Limitations

- Small sample size
- Single-centre study
- Geriatric population was not included.

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