

TREATMENT OF LATERAL THIRD CLAVICLE FRACTURES BY LOCKING COMPRESSION PLATE- A PROSPECTIVE STUDY

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Abstract

Introduction- Treatment of distal end clavicle fractures continues to be a challenge due to its high rate of non-union and malunion. The aim of the present study was to assess the functional outcome of patients with lateral end clavicle fractures treated with locking compression plate.

Material and Methods- 42 patients with fracture lateral end clavicle were treated with LCP over a period of two years between May 2014 and May 2015. The inclusion criteria were patients with displaced fractures. Compound fractures, pathological fractures and fractures involving middle third clavicle fractures were excluded from the study. Final scoring was done using the Constant and Murley Scoring system.

Results- The average age of the patients were 42±15 years. Road traffic accident was the commonest mechanism of injury with 33 (78.5%) cases. As per the Robinson classification system, 27 (64.3%) cases had 3B2, 8 (19%) cases had 3B1 and 7 (16.7%) cases had 3A1 type fracture respectively. The average time for radiological union was 8.4±16 weeks in 26 (61.9%) cases, 11.6±4 weeks in 9 (21.4%) cases and 14.2±6 weeks in 7 (16.7%) cases. There were 2 (4.7%) cases of superficial infection and 1 (2.3%) case of non-union found in the present study. 14 (33.4%) cases had excellent, 21 (50%) cases had good results.

Conclusion- Treatment of lateral end clavicle fractures using locking compression plate provides stable internal fixation helping in early mobilization. The small and comminuted fragments need to be tackled gently with utmost care.

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INTRODUCTION

Fracture of the clavicle accounts for approximately 5 to 10% of all fractures and up to 44% of injuries to the shoulder girdle. About 70% to 80% of these fractures are in the middle third of the bone and less often in the lateral third (12% to 15%) and medial third (5% to 8%)^[1]. Although many methods of closed reduction have been described, it is recognized that reduction is practically impossible to maintain and a certain amount of deformity and disability is expected in adults^[1,2]. Early fixation of these fractures to prevents complications like malunion and nonunion, thus promoting early functional recovery^[3]. The aim of the present study was to compare the functional and radiological outcome in patients with fracture lateral 1/3rd clavicle treated with plate and screws.

MATERIAL AND METHODS

Forty-two patients with fracture lateral end clavicle were treated at a tertiary care hospital over a period of two years between May 2014 and May 2015. All the fractures were classified using the Robinson classification. The inclusion criteria were skeletally matured patients with displaced lateral 1/3rd clavicle fractures. Compound fractures, pathological fractures and fractures involving middle third clavicle fractures were excluded from the study. All the patients were assessed in the pre-operative period clinically as well as radiologically. Final scoring was done as per the Constant and Murley Scoring system^[4]. Prior written consent was obtained from all the patients enrolled in the study. Ethical committee approval was obtained before the commencement of the study.

SURGICAL TECHNIQUE

General anaesthesia combined with interscalene block was used in all the cases. Patient was placed in a supine position with one towel in between the scapula. The entire upper limb, from base of neck to hand, was prepared and draped. About 5-8 cms, incision was taken anteriorly over the fracture site. The subcutaneous tissue and platysma were divided without undermining the edges. The overlying fascia and periosteum were next divided and the osseous ends were freed from surrounding tissue. Minimal soft tissue and periosteum dissection was done and the fracture site was opened. Fracture fragments were reduced by elevating the arm and plate was applied over the superior aspect of the clavicle. The pre-contoured plate was fixed to the medial and lateral fragment with 3.5mm cortical screw and at least three screws in medial and lateral fragment were applied. Wound was closed in layers after ensuring meticulous hemostasis and sterile dressing was applied. Post-operatively, the arm was kept in a sling. Gradual passive and active movements were started from the post-operative day 1 within the limits of pain tolerance. Regular follow-ups were done at 1,3,6 and 12 months respectively.

RESULTS

The mean age of the patient was 42 ± 15 years. There were 29 (69%) males and 13 (31%) females in the present study. Right sided involvement was seen in 23 (54.7%) cases whereas 19 (45.3%) cases had left sided involvement. The most common mechanism of injury was road traffic accident accounting for 33 (78.5%) cases followed by 9 (21.5%) cases who had a domestic fall. As per the Robinson classification system, 27 (64.3%) cases had 3B2, 8 (19%) cases had 3B1 and 7 (16.7%) cases had 3A1 type fracture respectively. The average time for radiological union was 8.4 ± 16 weeks in 26 (61.9%) cases, 11.6 ± 4 weeks in 9 (21.4%) cases and 14.2 ± 6 weeks in 7 (16.7%) cases. There were 2 (4.7%) cases of superficial infection, 3 (7.14%) cases of plate prominence and 1 (2.3%) case of non-union found in the present study. There were no cases of implant failure encountered in the present study. As per the Constant and Murley Scoring system, 14 (33.4%) cases had excellent, 21 (50%) cases had good, 6 (14.3%) cases had fair and 1 (2.3%) cases had poor results respectively.

STATISTICS

The qualitative variables were expressed in proportion and quantitative variables were summarized by mean and standard deviation.

Data was analyzed using Epi Info software (version 3.5.4).

DISCUSSION

Management of displaced fractures of the lateral end of clavicle continues to be a challenge for orthopaedic surgeons. Type II fractures as stated by Neer^[5], are lateral end clavicle fractures which are unstable and complex in nature separating the coracoclavicular ligament from the rest of the clavicle through a vertical or oblique fracture line. The major deforming forces acting at the clavicle includes Trapezius, which pulls the proximal fragment upwards and backwards whereas the body weight, latissimus dorsi, pectoralis major along with minor muscles tends to pull the distal part of the clavicle downwards and medially. This peculiar anatomical features makes the reduction of the fragment difficult.

Traditionally, these fractures have been treated with conservative line of management with varying outcomes^[6,7]. Although, conservative treatment can be a treatment of choice in undisplaced fractures, young patients with greater functional demands may continue to be symptomatic requiring surgery^[8].

There has been a wide variety of surgical techniques used for the treatment of these fractures namely the hook plate, Locking compression plate, suture and sling, Tension band wiring, Coracoclavicular screws and intramedullary nail^[9,10]. Krischner wires, Knowles pins are usually used for the transacromial fixation but these pins usually have a disadvantage that the stabilization is poor, infection and raised non-union rates and delayed mobilization^[11]. There is also a high risk of pin migration and arthritis of acromioclavicular joint^[12]. Open reduction with plate and screws although requires a wide exposure, but gives a secure and stable internal fixation with principles of angular stability, thus alleviating issues like ac joint arthritis, sub acromial impingement and fixation failure. Due to the low profile reconstruction of this plate, stress riser can be avoided around the fracture site and early mobilization can be achieved.

The pull-out strength of locking screw is far better than the standard screw as the mechanism avoids compression at the bone plate junction^[13]. This also preserves the underlying blood supply to the bone. Hessman et al^[14] were of the view that the distal fragment should be able to accommodate atleast 3 screws for a better purchase. In the

present study, we could get at least two screws in the distal fragment in majority of the cases. The rate of union in the present study were similar to other studies by Robinson et al^[8] and Rokito et al^[15]. There was one case of non-union in the present study which was later operated with hook plate and bone grafting. Good union was obtained at 12 weeks following the second surgery. There were two cases of superficial infection which responded well to oral antibiotics. The final outcome of the surgery was similar to the study by Rokito et al^[15] using the Constant and Murley scoring system with 35 (83.33%) cases having excellent to good outcome. Small number of sample size and less duration of follow-up were few limitations of the present study.

CONCLUSION

Treatment of lateral end clavicle fractures using locking compression plate provides stable internal fixation helping in early mobilization. The small and comminuted fragments need to be tackled gently with utmost care. Although there were problems such as plate prominence and superficial infection, no implant failure was encountered in the present study. Majority of the patients had excellent and good outcome with plating. Thus, we recommend the use of locking compression plating in treatment of lateral end

clavicle fractures with augmentation by sutures for coracoclavicular joint reconstruction.

Conflict of Interest Statement-

There is no conflict of interest.

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