

Management of Clavicular Midshaft Fractures with Help of Titanium Elastic Nails

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Abstract

Background and Aim: There exists controversy on the treatment of displaced midshaft clavicle fractures. Such type of treatment included non operative as well as operative type. Hence forth the present study was performed with the aim to analyze the use of elastic, stable intra medullary titanium nails as a new invasive procedure. *Materials & Methods:* The totals of 40 cases with clavicle fracture were included in the study. The present study is randomized control trial. Out of 40 cases; 20 cases were treated conservatively and 20 cases were treated with intramedullary nailing. Follow up of the cases were taken in 4th, 8th, 12th week, 6th month and 12th month. Time taken for the union of the fracture was calculated radio graphically; functional outcome was measured utilizing Constant Murley Shoulder score. *Result:* At the end of the study when the comparison was done it was found that union of fracture by intra medullary nail group had less time as compared to conservative group. The difference was found to be statistically significant. Difference of functional outcome at regular interval follow up was also found to be significant. *Conclusion:* It is concluded that intra medullary nail treatment outcome is secure invasive surgical method with early union, quick return to routine work and lesser difficult faced.

Keywords: Clavicle; Conservative; Fracture; Intra Medullary Nailing.

Introduction

Treatment of displaced midshaft clavicular fracture is still under controversy. In many cases the operator favours non invasive/operative procedure and some time leads to good result [1]. The rate of non union limits to 15% of cases in regards the displaced midshaft fracture. In the follow up cases even after 9 years sometime, high rate of sequelae is seen. Hence taking the above point into consideration; operative treatment should be taken into consideration [2]. This should include gross dislocation or marked shortening of the clavicle. Many difficulties such as hematoma, implant failure, non union and infections have been revealed with

the use of plate fixation [1,3-5]. Hence the present was conducted to see the outcome of the usage of intra medullary elastic nail and compare it with older conservative treatment.

Materials and Methods

The current randomized study was performed at department of orthopaedics in the medical institute with the period ranging from Jan 2016 to Aug 2017. A total of 40 patients with the initial diagnosis of expatriate MSCFs were included in the study. Of the total 40 patients included in the study they were equally divided into two groups; one group

individuals were treated surgically with elastic intra medullary nailing and the other group individuals were treated with figure of 8 clavicle brace. The entire individuals included in the study were prior informed about the study and the informed consent was signed by all the patients. Also the ethical committee of the institute was informed about the study and the ethical clearance certificate was obtained prior to the start of the study.

Inclusions Criteria

Displaced middle third clavicle fractures, age range of 18–60 year with active recreational life style, comminuted fractures, mid shaft clavicular fracture with other injury.

Exclusion Criteria

Fracture older than 4 weeks, open fracture, age < 16 yrs, pathological fracture.

Robinson's classification [6] was used for the classification of the fractures. Within one week after the admission into the hospital all the patients were operated.

Conservative Treatment

The patients were asked to sit straight on the stool of adequate height and the back to face to the surgeon. Sterilization was maintained. Fracture was reduced and ready figure of 8 clavicle brace was applied approaching to the proximal third of the fracture. Figure of 8 clavicle brace was tensed up to preserve the position of clavicle. Pulses were monitored on both the side after applying the braces. If any irritation or blazing sensation was experienced after the application of the braces than the patient were informed to report immediately (Figure 2).

Surgical Technique

General anesthesia was used for the surgery. Supine position was used for the patient position and sand bag was kept in the inter scapular region. A skin incision of 1 cm was made parallel to the clavicle towards the sterna end of the clavicle. The anterior cortex was opened with an awl about 1.5 cm lateral to the sterno-clavicular joint. A TENS mounted over T- handle was placed and made advanced to the site of fracture. If the closed reduction was not possible, incision of 2 cm length was made at the level of fracture for mini open fracture reduction (Figure 1). Small reduction forceps or towel clips

were used for retaining the reduction. Next step was the advancement of the nail cross wise in to the lateral fragments with gentle rotational actions. Care to be taken to not to penetrate more laterally so that the nail gets into the acromioclavicular joint. The nail is than bent over and cut with a blunt tip and buried under the skin. Sutures were applied for closure. Arm sling was put later on after the surgery. To check the alignment 3 week post surgical radiographs were done. Arm sling was discontinued after time of 6 weeks. Every 4 week the follow up was planned to do the local examination of the clavicle for instability, shoulder movements, deformity and tenderness was measured.

At every regular follow up x rays were taken to measure the fracture union and asses the position of implant placed. Constant & Murley scores were used to assess the functional outcomes at regular follow up. If the score ranges from 90–100 outcomes were considered as excellent, 80–89 score was considered as good, 70–79 scores was considered as good, if the score is less than 69 it was considered as poor. Complications were recorded; like non-union, wound infection, implant irritation and malunion.

Results

In the present study there were total of 40 individuals, out of whom there were 30 males and 10 were females. Owing to the right 26 patient had fracture of right side and 14 had fracture on left side. The mean age of the conservative group was 36.20 ± 12.58 years and that of operative group was 33.60 ± 11.23 years.

Radiograph was used to assess the union of fracture; the mean duration of the fracture union was found to be 14.8 ± 4.9 weeks in the surgical operative group where as in conservative group it was found to be 27.6 ± 3.8 weeks. Constant & Murley score was assessed at 6 months, 9 months and 1 year. At the end in the final assessment; in operative group excellent score was obtained in 15 cases, good in 4 cases and 1 was found to have fair score, where as in conservative group excellent score was obtained in 12 cases, good score in 5 cases and fair in 2 cases and 1 case had poor case.

Mean constant & murley score assessment was found to be 93.5 for operative group and 87.6 for conservative group, the difference when assessed where to be statistically significant. Thus when the functional outcome and radiological union values were assessed than the difference were to be

significant for the operative group as compared to the conservative group. Few complications were also observed in both the groups. Non union cases were found in 2 cases, mal union was observed in 6 cases and delayed union was seen in 1 case in conservative group. While in operative group there werer 2 case of delayed union and one of the patient complain of medical cut with skin irritation & penetration, this thing eventually lead to implant elimination following fracture union under local anaesthesia. In the operative group, 14 patients experienced the prominence of nail at the sterna end but in end it was not much worry.



Fig. 1: Incision for Nail entry & mini open fracture reduction



Fig. 2: FCB (Fig of 8 clavicle brace) -front and back

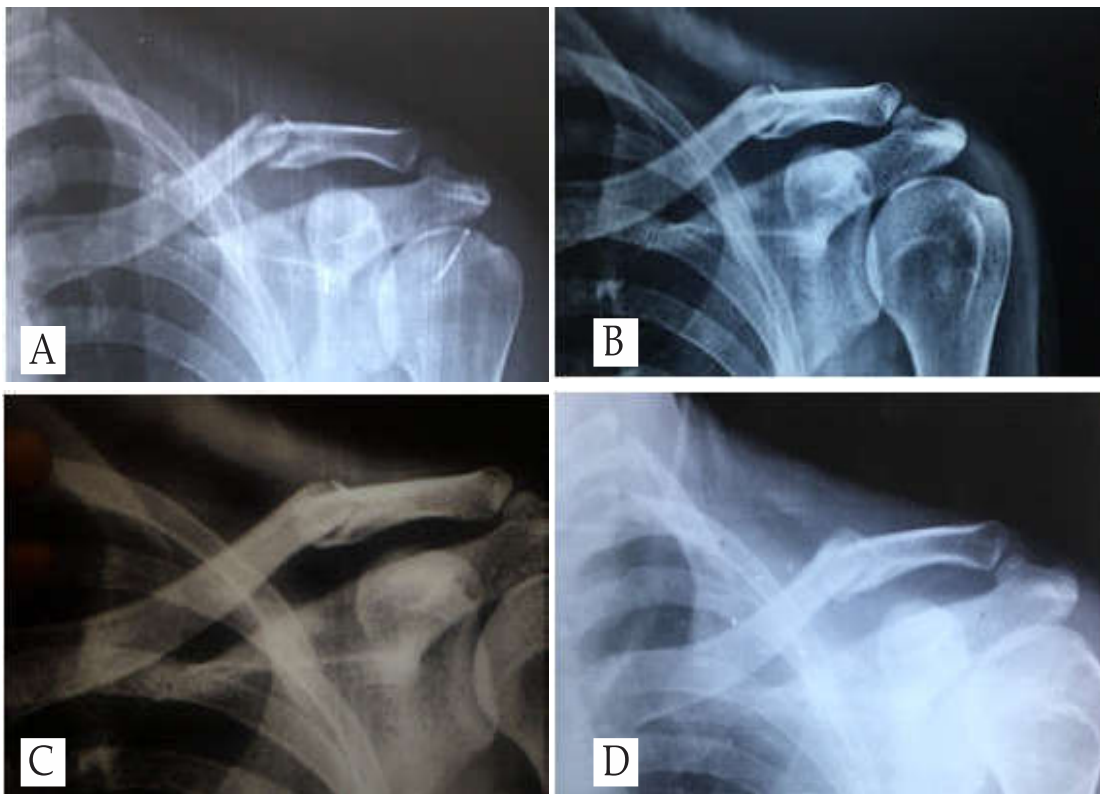


Fig. 3: Case-1 Radiograph a. post trauma, b. 6 weeks f/u, c.10 weeks f/u, d.union

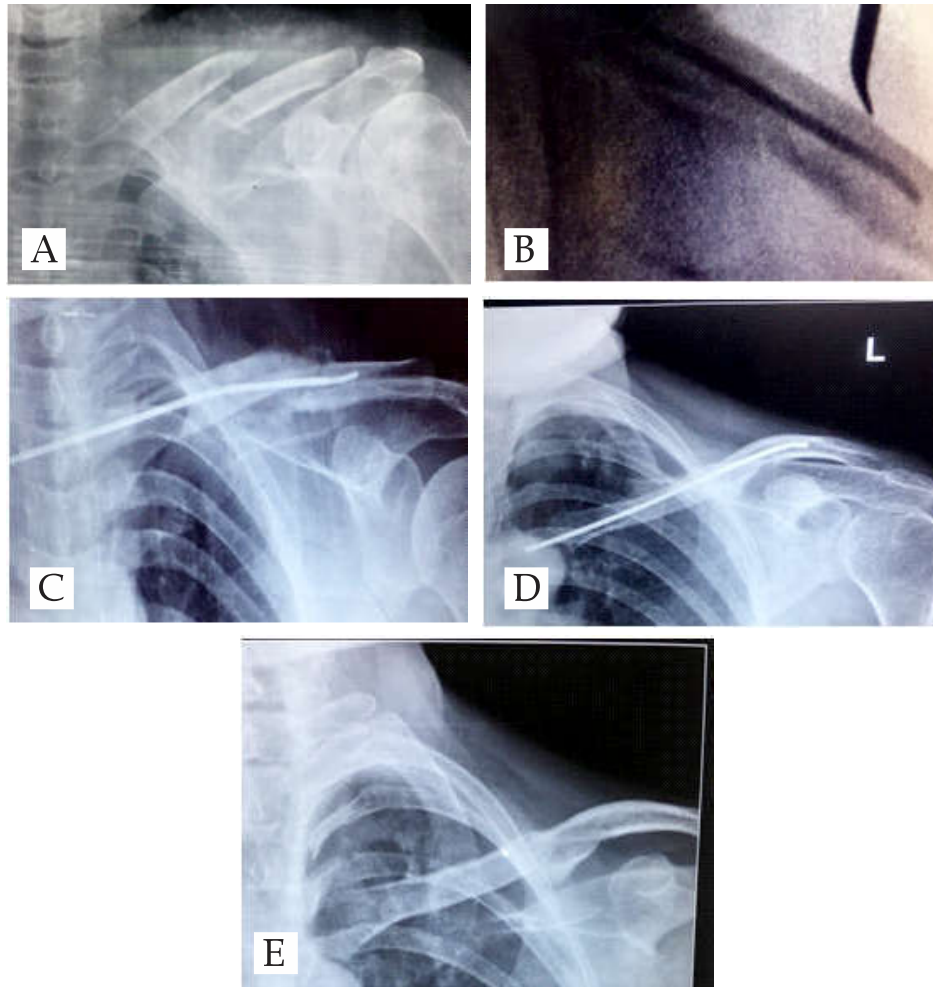


Fig. 4: Case-2 radiographs- a.pre op, b. post op, c.6 week f/u, d.10 week f/u, e.union



Fig. 5: Penetration of implant from entry point

Discussion

Conservative means for the management of the clavicle fractures have been used for long period of time. Various conservative methods used were in form

of plasters, figure of 8 bandages and form of sling etc. There was union of the fracture but there was malformation in the displaced fracture. Although the attention in the operative treatment has grown from open reduction to closed reduction and fixation at last, but still conservative treatment remains the choice of method and fracture are treated conservatively still.

In a study carry out to examine the results of conservative treatment by Hill et al [5] in 1997, Nordqvist et al [7] in 1998 and Robinson et al [6] in 2004 found deprived results following conservative treatment of displaced middle third clavicle fracture. In a meta-analysis of the literature from 1975 to 2005, Zlowodzki et al [8] found that the non-union rate for non-operatively treated displaced midshaft clavicle fractures was 15.1%, exponentially superior than formerly described. High-quality results with high union rates and low complication rates have been reported from a diversity of techniques for primary fixation of displaced fractures of clavicle [9,10]. So, there are precise suggestion like displacement, with

or without comminution for middle third clavicle fracture for which operative treatment is needed. The mean time for fracture curing (radiological union) was shorter in the operative group (14.8 weeks) than nonoperative group (27.6 weeks). McKee et al [9] explained the mean time for fracture healing were 14-16 weeks for operated patients and 24-28 weeks for non operated patients. The problems were supplementary in the nonoperative group like suggestive malunion 6 cases, non-union in 2 cases and delayed union in 1 case. The hitches eminent in the operative group were Medial cut end eminence and infiltration in 1 case and delayed union in 1 case due to comminution at fracture site. Not any of the operated patients had nonunion or malunion. No infection was observed in the operative group. All surgical wounds healed between 10 and 14 postoperative days. McKee et al reported the rate of nonunion in the nonoperated patients 14-24%, and 3.2% in the operated group. Iatrogenic neurovascular vascular wound is a threatening impediment if accurate operative techniques are not followed. Since Chief neurovascular structures like subclavian vein, subclavian artery and brachial plexus are near to the surgical field [11-13]. Nevertheless, in this study, none of our operated patients developed any neurovascular damage. The Constant Murley Score at 6 months, 9 months and 1 year follow up was estimated. Mean score for operative group was 91.7 and for conservative group was 85.8, which is statistically significant.

Conclusion

Elastic stable intramedullary titanium nailing is a safe minimally invasive surgical technique with lower complication rate, faster return to daily activities and early union. Thus, primary operative intervention in clavicle fracture in active adults may be of immense importance.

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Conflict of Interest: None declared.

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