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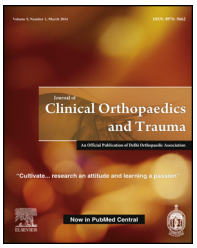

Original Article

Comparison of treatment of fracture midshaft clavicle in adults by external fixator with conservative treatment

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ABSTRACT

Purpose: High rate of malunion and non union in displaced fracture clavicle treated conservatively lead to use of different types of internal fixation methods which also were found to be associated with various complications. Moreover their superiority over conservative treatment has not been established. This study was designed to compare clinical outcome of conservative treatment with external fixator in cases with displaced midshaft clavicle fractures.

Methods: Fifty adult consenting cases of acute midshaft fracture clavicle, displaced >15 mm were included. Twenty five cases were allotted to conservative (group A) and external fixator (group B) each. In group A treatment was given in form of clavicle brace. In group B schanz pins were inserted obliquely between supero-inferior and anterior-posterior direction and connected with rod. The outcome was measured by Constant score, union time and complications.

Results: Mean radiographic union time in group A was 23.45 ± 1.40 weeks (with 8% non union and 80% malunion) and in group B it was 9.36 ± 1.49 weeks. Mean Constant score at 6 months in group A was 78.28 ± 6.45 and in group B 92.72 ± 1.48. Mean shortening at 6 months in group A was 19.36 mm. In group B shortening at 6 months was noticed in three cases (6, 5, 6 mm).

Conclusion: Close reduction of acute fracture mid clavicle and application of external fixator is a simple procedure providing the benefits of rigid fixation and undisturbed fracture environment. Pain relief is faster, union time is shorter and there are no hardware related problems.

1. Introduction

Clavicle fracture is one of the most common fractures in adults. Majority of clavicle fractures are situated in the middle (81%).[1]

All methods used for treatment of displaced fractures of midshaft clavicle have shortcomings. Conservative treatment of displaced fracture clavicle leads to shortening of clavicle, pain, loss of strength, rapid fatigue, hyperaesthesia of the hand and arm, difficulty sleeping on the affected side and aesthetic complications.[2–6] More than 9.7% shortening of

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clavicle of its original length is associated with poor outcome.[7] There is evident association between shortening and non union.[3] Pseudarthrosis (upto 5%),[8] high rate of malunion (upto two thirds)[9] and non union (upto 15%)[3] have been reported with displaced fracture treated conservatively. Many patients remain symptomatic for long time with increased risk of prolonged sequels at 9–10-year follow up.[10]

In cases of displaced or comminuted fractures operative treatment is reported to be better than conservative treatment[2] but every fixation method has associated complications.

Intra-medullary devices are difficult to insert in clavicle due to inherent gentle s shape of the bone and small medullary canal. They can be associated with complications such as hardware failure, nerve injury, skin breakdown[11–13] hardware migration and neurovascular injury.[14,15] Without static locking mechanism there can be shortening of the clavicle in comminuted fractures.[12,13]

Plate fixation is associated with infection (5–22%), hardware irritation (9–64%), subcutaneous prominence, poor cosmesis due to postoperative scar, resurgery to remove plate, refracture after removal of plate and even non union after plating.[2,3,16,17]

Recently reported studies and cochrane review have not been able to establish clear superiority of operative over conservative management in fracture clavicle.[18–20] This study was conducted to evaluate the clinical outcome and complications of fracture clavicle treated by external fixator in comparison to conservative method.

1.1. *Research question*

Does acute displaced fracture midshaft clavicle treated by external fixator result in better outcome than conservative method.

2. Methods

This study was conducted between October 2010 and April 2012. Fifty adult patients with midshaft clavicle fractures were enrolled in this study which was designed as a case control study. Institutional approval was obtained from the local Ethics Committee before initiation of the study. Informed consent was obtained from cases.

All consenting adult patients with less than one week old closed midshaft fracture of clavicle (Fig. 1) were included in the study. The fractures that were completely displaced, comminuted or with shortening of more than 15 mm (in comparison to normal side) were included.

Open fracture clavicle, associated neurovascular injury, undisplaced fracture, fracture of medial or lateral ends, non union, malunion, medically unfit and non-consenting cases were excluded.

The conservative treatment was given in form of clavicle brace application. The affected upper limb was supported in an arm pouch. The clavicle brace was discontinued at 6 weeks but arm pouch sling was continued till union was ascertained. Pendulum shoulder exercise was initiated when pain resolved. Range of motion exercises were initiated after union was ascertained.

2.1. *Technique of clavicle external fixation*

Patient was put in supine position with a sandbag between the scapulae. Closed reduction was done under image intensifier guidance (antero-posterior and 45° cephalic tilt in antero-posterior) and was provisionally fixed with Kirschner wires. Two schanz pins (3.5 mm) were inserted on medial fragment from anterior to posterior in horizontal plane in slightly cephalad direction to avoid the injury to the pleural dome. On the lateral fragment two schanz pins were inserted obliquely between supero-inferior and anterior-posterior direction to avoid neurovascular structures. The pins were connected with the appropriate length of 'gentle S' shaped rod to complete the construct (Fig. 2). The limb was supported in an arm pouch sling. At each follow up pin sites and fixator stability was checked clinically and radiologically, till union. The fixator was removed when radiological union was evident (Fig. 3). The fracture was considered to be united when there was no tenderness and the fracture line was not visible or callous formation was seen on X-ray. Gentle pendulum exercise of the shoulder in the arm pouch was initiated at second day of surgery. At 4 weeks active range of motion of the shoulder was allowed but abduction was restricted to 80°. At 8 weeks active range of motion in all planes was allowed.

Follow up was done at 2, 4, 8, 12, 16, 20 weeks and finally at 6 months for both the groups. The outcome was measured in terms of Constant and Murley score, union time and complications. The functional outcome by Constant and Murley score was performed at 6 months. The length of fractured

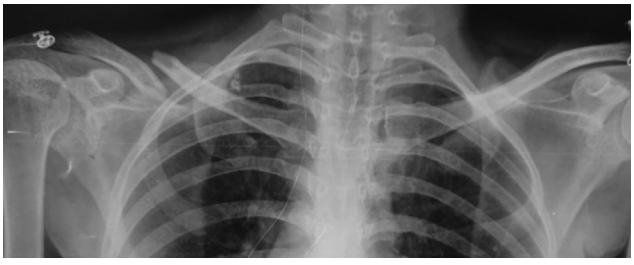

Fig. 1 – Shows displaced fracture midshaft clavicle.

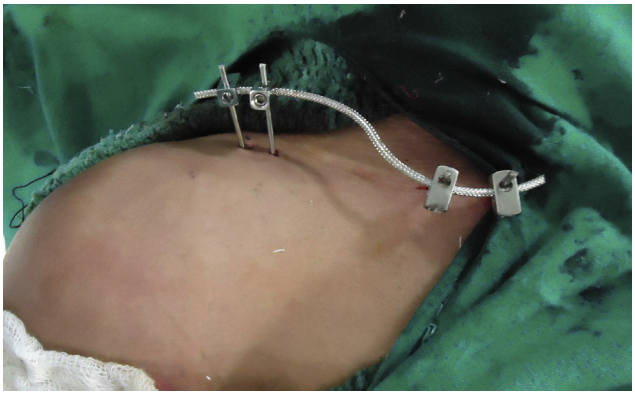

Fig. 2 – Shows external fixator on right clavicle after close reduction.