

MID-SHAFT CLAVICLE FRACTURES;

Surgical Management

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ABSTRACT.. Objectives: To study the time to union and complications after open reduction and internal fixation of mid-shaft clavicle fractures. **Design:** Retrospective. **Settings:** Midlands Orthopedic/ Sports Injury Clinic, Bahawalpur. Study Period: 2003 to December 2012. **Material and Methods:** The medical record of the patients operated for mid-shaft clavicle fractures was searched to find out the time to union and occurrence of complications during this period. **Results:** The time to union was 4.6 months and there were two complications. A prominent implant had to be removed and one non-union required additional bone grafting procedure. **Conclusions:** This small series shows that the rate of complications is low and a larger study is needed to expand the indications for operative fixation of clavicle fracture safely.

Key words: Clavicle fractures, time to union, complications, reconstruction plate

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INTRODUCTION

Clavicle fractures constitute about 4-10% of all fractures in the adults. About 35-45% of all shoulder girdle fractures are clavicle fractures^{1,2}. Fractures of the mid-shaft account for approximately 80% of all clavicle fractures. Most of these injuries are the result of fall on the tip of the shoulder in contrast to the past concept that they were the result of fall on the outstretched hand. About 70% of clavicle fractures are the result of road traffic accidents and most occur in young adult males^{3,4,5}. Fractures treated in broad arm sling heal with some shortening and bony prominence. The absolute indications for fixation of clavicle fracture fixation have been open fractures, polytrauma, associated neurovascular injury etc. However, certain fracture patterns have shown the need for early fixation. Recently, there has been a trend towards open reduction and internal fixation of the mid-shaft clavicular fractures^{6,7,8,9}. Plate fixation provides rigid fixation, early mobilization and an earlier return to normal activity.

MATERIALS AND METHODS

The medical record of 12 patients operated at Midlands Orthopedic/Sports Injury Clinic, Bahawalpur between 2003 and December 2012 was

retrospectively evaluated. All the patients were operated by a single surgeon. Selection criteria included fractures with tenting of skin, delayed union and desire to return to early use of upper limb. Ten out of 12 patients were males. Age ranged from 28-45 years. All had tried conservative management with broad arm sling or bone setting by local bone setters and were not happy. The surgical approach was superior and the patient had been positioned in modified beach chair position. The fixation device consisted of a reconstruction plate bent to conform to the contour of the clavicle. The plate was fixed in superior position. Interfragmentary fixation was done wherever possible. The patients were given a broad arm sling for the first week for comfort. On the first visit at one week post-operative physiotherapy was started. The stitches were removed at two weeks with a gradual return to activity. The patients were then followed up at 6 weekly interval post operative patients were allowed full use of the upper limb when radiological union was achieved.

RESULTS

The record of the clinic was searched for patients who had undergone fixation of the clavicle. Age range was 18-45 years. Ten out of twelve patients were males.

Time to union and complications was assessed. Mean time to union was 4.5 months. Union was uneventful in 10 cases. One patient demanded the implant to be removed because of prominence. One patient had non-union and required bone grafting which then lead to union.

DISCUSSION

Fractures of the clavicle are common injuries with more than 75% of the fractures occurring in the midshaft of the clavicle¹⁰. Classically nearly all clavicle fractures have been treated conservatively by a broad arm sling or figure of eight bandage¹¹. While broad arm sling showed better patient satisfaction, figure of eight was associated with many complications like axillary pressure sore and neurovascular compression¹². Past studies had shown great satisfaction level with conservative management while open reduction was associated with higher rates of non-union^{13,14,15}. However, 42% of people still had sequelae at 6 months in one study⁵. The same study suggests the exploration of alternative treatment options, including surgery, for certain clavicular fracture types.

McKee in his study of nonoperative treatment of displaced mid-clavicular shaft fractures detected significant residual deficits in shoulder strength and endurance. However, there was no control group that was treated surgically¹⁶. Only fractures for which there was absolute indication for fixation were internally fixed. Internal fixation for the rest of fractures was usually reserved for symptomatic non-union. There are certain fracture patterns for which early fixation are advisable to reduce the incidence of non-union, shoulder weakness and early fatigue¹⁷. These fracture patterns include mid-shaft fractures with greater than 2 cm of shortening or 1 cm displacement and unstable type II fractures of the distal end of clavicle¹⁸. The increasing role of surgical treatment in these frequent injuries has been outlined by McKee et al¹⁶. Significant shortening of the clavicle can alter the normal alignment of the shoulder girdle leading to dysfunction

with high demand activities. Complete healing of the clavicle fracture takes about 3-6 months and then 15% of the fractures might go into non-union. Early fixation has some advantages like early return to work and activities, less pain (fracture is stabilized), better chances of healing and less chances of malunion.

Potter and his colleagues evaluated 29 patients with closed, isolated and completely displaced midshaft clavicle fractures. The acute group included 15 fractures, treated with open reduction and internal compression plate fixation at a mean 0.6 months after fracture. The surgeon randomized 14 patients to the delayed group. All delayed group patients suffered from malunion or nonunion and underwent open reduction and compression plate fixation at a mean 66 months after fracture. There was no significant difference between groups with respect to gender, age, fracture of the dominant limb or fracture mechanism. In addition to the DASH and Constant Shoulder questionnaires, the investigators also conducted objective muscle strength and endurance tests using the Baltimore Therapeutic Equipment (BTE) Work Stimulator. Patients subjectively rated their satisfaction with the surgery on a scale of 0 (extreme dissatisfaction) to 10 (extreme satisfaction). Straight recovery was excellent in both groups in shoulder flexion, abduction, internal and external rotation. There was no statistical difference between the two groups. But, muscle endurance was much better in the acute fixation group and the difference was significant¹⁹.

In a prospective, randomized, multicenter study of more than 100 patients with displaced midshaft clavicle fractures, for example, the nonsurgical group healed at an average of 28 weeks, while the surgical group healed at an average of 16 weeks. These conclusions were reinforced by another prospective, observational study that also found higher nonunion rates in patients treated nonsurgically¹⁹.

Absolute indications for fixation are open fractures and

neurovascular injury requiring exploration and repair. The strongest relative indication for surgery is a displaced clavicle with 2 cm or more of shortening. Other relative indications include multiple extremity involvement, floating shoulder, seizure disorders, and cosmesis. When considering surgery variables such as degree of displacement, shortening, and comminution should be carefully considered. Other variables include location of the injury (dominant or nondominant arm), the patient's activity level, status of the physes (open or closed), and the existence of other injuries. Incisional numbness and hardware irritation are real and not infrequent complications, as are scar concerns and the risk of infection. Studies support the risk of surgical complications.

In one study, 53 percent of surgical patients required plate removal. In another study of 125 patients who underwent ORIF, 12 percent needed reoperation, 4 percent had plate breakage, and 3.2 percent had loosening. Other complications included infection and frozen shoulders^{17,18,20,21,22}.

CONCLUSIONS

In our small series we have seen that there are few complications and an earlier return to pre-injury status with no visible deformity. However, further comparative studies are needed to compare the results with other studies.

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