

Evaluation of results of fracture Clavicle by Reconstruction Plate

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Abstract :

Background: Clavicle being most common fracture in human. It is mainly managed conservatively. The results are further improved surgically. Most common surgical treatment is locking compression plating. The aim of the present study is to compare results of reconstruction plating for mid shaft clavicle fractures over locking compression plate.¹ **Material & Methods:** The study was conducted on the patients of clavicle fractures visited to Department of Orthopedics of Tertiary Care Hospital, Ahmednagar. Total 69 patients were operated with 3.5 millimeter reconstruction plate in this study, during the period of 3 years 2016-2019. Total 63 were male and 6 were females. All fractures were fixed with reconstruction plating and the butterfly fragments were stabilized with k-wires. The functional outcome was measured by the constant and murely score² at the end of 3 months from the injury. The fracture union time and associated problems are also compared. **Results:** Out of 69 patients, 61 patients (88.41%) had excellent results. 5 patient (7.25%) had good result and 8 patients (11.60%) had poor functional outcome. 5 patients (7.25%) had complications out of which 1 patient (1.45%) had plate breakage, 2 patients (2.9%) had migration of pin. There was superficial infection in 2 patients (2.9%). The study shows excellent results with simple effective economic reconstruction plates with k-wires. The complications were minimal, mainly in the form of pin migration which was only subcutaneous, removed at the time of implant removal. **Conclusion:** In these study results of reconstruction plating for mid

shaft clavicle fracture was studied. It was found that results were improved, in patient's oriented outcome, earlier return to the function, reduced nonunion and mal union and was more effective and economical. For management of mid shaft fracture clavicle. The locking compression plate was not found any superior to reconstruction plate.

Key words: Mid shaft clavicle fracture, Reconstruction plating, 1 millimeter k-wire.

Introduction:

The clavicle is a long curved membranous cancellous bone which acts as a link between the axial and the appendicular skeleton. It is the first bone to start getting ossified (5 to 6 weeks of gestation) in the body and last bone to complete the ossification as late as 27 years. It is approximately 140 to 150 mm in length. The clavicle is the commonest fractured bone being subcutaneous in nature, seen in the medical emergency which is around 5 to 10 %. It is seen usually in young active individuals often associated in direct trauma as in contact sports or fall due to motor vehicle accident. Males are more affected than females. Clavicle injuries can be divided according to anatomical sites, medial one third, middle one third and lateral one third. Mid shaft clavicle fractures are most common with incidence up to 82%. Medial & lateral end clavicle fractures are 18 & 2% respectively. Majority of the fracture clavicle is managed conservatively, most commonly sling and figure of '8' bandage or combination of both. It is practically impossible to maintain the reduction throughout conservative line of treatment, this results disability and deformity.³

There are various surgical methods available for management of fracture clavicle which are practiced, includes kirschner wire fixation, plate fixation, external fixator, modified hook plate fixation. In this study we have treated all mid shaft fracture clavicle surgically by reconstruction plate and 1 millimeter k-wire for butterfly fragment.

The early fixation of fresh clavicle fracture prevents complications like mal union and nonunion and emphasizes the value of accurate reduction and fixation resulting in quick pain relief and functional recovery.¹

Materials & Methods:

The study was conducted on the patients who were visited to the Department of Orthopedics of Tertiary Care Hospital, Ahmednagar. Total 69 patients were studied during the year 2016-19. Total 63 Males and 6 Females are included in this study.

Inclusion criteria:

1. Only mid shaft Clavicle Fractures
2. All age groups
3. Unilateral Clavicle
4. Only displaced fractures
5. Closed Fractures

Exclusion criteria:

1. Undisplaced Fractures
2. Compound Fractures
3. Pathological Fractures

Patient Data: apart from sociodemographic data

Type of trauma - either fall on outstretched hand or direct fall on shoulder.

Past medical history and family history.

Plain antero-posterior X ray of clavicle with shoulder was taken to note Butterfly fragment

Surgical Technique:

Instruments used for plate fixation: 3.5 mm reconstruction plate put antero superiorly after making 'S' shaped 10 – 15 cm incision over fracture site. The skin, subcutaneous tissue and platysma were divided without undermining the edges. The osseous ends were freed, fracture fragments were reduced and the reconstruction plate was fixed. Three 3.5 mm bicortical screws were fixed. Butterfly fragments were fixed with 1 mm k-wire. Wound was closed in layers after keeping drain.



Clavicle – Pre Operative



Clavicle with Reconstruction Plate and K-wire



Plate breakage with Pin Migration



After broken Plate and K-wire removal

Post-operative Care:

Sling for 3 weeks – Pendulum exercises were initiated after pain subsidence post operatively.

Active mobilization gradually initiated.

After 6 weeks all types of exercises were started and patients were allowed to do day to day activities as per pain tolerance.

Follow Up:

Patients were asked to come for stitch removal after 10 days. Then every 1 month for first 3 months they were called and active physiotherapy was advised. Check X rays were taken after first post-operative day and then every month for first 3 months and then x ray was taken at the time of implant removal approximately 1 year.

Clinico-radiological assessment done at 1, 3 and 6 months. Complications were noted and address accordingly if any.

Patients were assessed in terms of union, complications like nonunion, plate breakage, k-wire migration, and shoulder stiffness.

Results:

In our study out of 69 patients, 67 patients had fall from motor vehicle accidents. 2 patients had fall from height. All age group patients were included. The youngest patient was 12 years old & the oldest patient was 65 years old. The majority of the patients are between middle active age group. Out of 69 patients, 63 were males and 6 were females. All patients were operated in first week of the fracture. The delay happened because of the delay in admission. The fracture was considered to be united; when clinically there was no tenderness and radiologically there was no fracture line and full function of the limb was possible. 61 patients (88.41%) had union at the end of 3 months. In every patient reconstruction plate was used. Reconstruction plate was used instead of locking compression plate because reconstruction plate is easy to counter, easily available and more economical considering the socioeconomic status of the rural patients. Also we really do not require strong fixation like locking compression plate in clavicle since union is not a major issue. Out of 69 patients, 61 patients (88.41%) had excellent results. 5 patient (7.25%) had good result and 8 patients (11.60%) had poor functional outcome. 5 patients (7.25%) had complications 4-6 out of which 1 patient (1.45%) had plate breakage, 2 patients (2.9%) had migration of pin. There was superficial infection in 2 patients (2.9%). Out of 20 butterfly fragment fixation was done with 1 millimeter k-wire. We found 1mm K-wire easier to fix

even a small butterfly fragment in any direction. It was found more difficult by 2 millimeter screw resulting in more fragmentation and soft tissue devitalization. 4 patients (20%) had subcutaneous pin migration out of 20 k-wire fixation of butterfly fragment. These pin migrations were asymptomatic. Pins were removed at the time of implant removal.

Discussion:

Mid shaft Clavicle fractures are 80% amongst all types of clavicle fracture. It is mainly seen in middle aged patients with active life due to road traffic accident resulting in direct trauma or fall on an out stretched hand. Nerrs reported 0.1 to 18% nonunion of the fracture clavicle.⁷ Craig et al showed that nonunion mainly takes place in middle third clavicle.^{3,8} A literature reports high rate of good out come with low rate of nonunion after surgical management of clavicle. Due to increased demands by the patients and good surgical outcome, the surgical procedure is taking more popularity. Hill et al⁹ in 1997 Nordquist et al¹⁰ in 1998 and Robinson et al¹¹ 2004 found poor results following conservative treatment of conservative treatment of fracture. It has higher rate of nonunion and residual shoulder dysfunction as showed by Edward et al¹² in 1992. So there are specific indications like displacement with or without communicated middle third fracture for which operative treatment is needed. The present study is compared with fracture clavicle plate fixation by locking compression pate by R.K.S. Dhakad et al.¹³ It definitely gives anatomical union with less deformity and less morbidity in terms of stiffness of shoulder. Mckee et al observed higher dissatisfaction and residual disability in patient with clavicle shortening greater than 20 mm.¹⁴ In patients who were treated conservatively. Chan et al suggested a potential association between clavicle shortening and shoulder dysfunction when treated conservatively.¹⁵ In our study we observed significant improvement in shoulder function and early post op recovery to near normal in first one month.^{16,17} Majority of the patients returned back to normal work, including manual labour, farming, driving two wheeler in there months post operatively.

Conclusion:

Clavicle fracture is a common fracture occurring during road traffic accident. It is commonly due to fall directly on shoulders or fall on an outstretched hand. It is treated mainly conservatively and now a day's surgically often due to demand of the patient. In our study we have managed all types of clavicle fractures surgically in majority of the cases with reconstruction plate. Reconstruction plate was mainly chosen because it is easy to contour according to shape of clavicle. It is freely available and more economical than locking compression plate. In clavicle fractures locking compression plate is not mandatory because union in fracture clavicle is not a major issue if the fracture is aligned anatomically. Small fragment was stabilized by 1 millimeter K-wire. It is easy to fix small butterfly fragments keeping the soft tissue attachments intact. Using 2 millimeter screw is difficult to fix because the butterfly fragment may be of any direction and of any size. Keeping soft tissue attachments intact is difficult if one passes 2 millimeter screw. In our study the result with reconstruction plate are excellent, quite economical with minimal complications and it is not at all necessary to use locking compression plate.

In this study early primary plate fixation of communicated mid shaft clavicle fractures results in improved patient oriented outcomes, earlier return to function and decreased rate of non union and mal union. Locking compression plate does not have any substantial superiority over reconstruction plate.

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