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A study on post operative complications in management of fracture of clavicle

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Abstract

The majority of clavicular fractures (80% to 85%) occur in the midshaft of the bone, where the typical compressive forces applied to the shoulder and the narrow cross section of the bone combine and result in bony failure. Patients were clinically examined; first aid was given in the form of, cuff and color sling, analgesics, antacids and was subjected to A-P view, Lardot view radiograph of full length clavicle to decide the plan of definitive management. If needed CT scan and MRI were also taken. Those requiring surgery were classified as per Allman classification and investigated for fitness for anesthesia and surgery. Six patients had associated skeletal injury three patient had fracture ribs, two had fracture femur one had polytrauma (fracture right clavicle, left ulna, right femur). Five cases had CCI (crainio-cervical injury) Most of the cases had no other associated injuries.no associated neurovascular injury were noted. Overall plate had more intra op and post op complications like more blood loss, more operative time, superficial infections, deep infections, implant protuberance, ugly scar, difficult implant removal than TENS fixation. In this study nonunion was equal in both TENS and plate fixation groups.

Keywords: Post operative complications, management, fracture of clavicle

Introduction

Clavicle acts as a “strut” that keeps the upper limb away from the torso for efficient shoulder and upper limb function, and also transmits forces from upper limb to the trunk.

The medial segment is pulled superiorly by the sternocleidomastoid. The weight of the arm pulls the lateral segment inferiorly through the coracoclavicular ligaments, but is opposed by the trapezius. In addition, the pectoralis major and latissimus dorsi pull the lateral segment inferomedially with resultant shortening and displacement which leads to poor cosmetic and functional results^[1].

The majority of clavicular fractures (80% to 85%) occur in the midshaft of the bone, where the typical compressive forces applied to the shoulder and the narrow cross section of the bone combine and result in bony failure.

Fractures of clavicle are known since ancient time, earliest description of fracture clavicle is found in Egyptian literature in 3550 BC. An unknown Egyptian surgeon describe a method of reducing a clavicle fracture; ‘thou shouldst place him prostrate on his back with something folded between his shoulder blades, thou shouldst spread out with his two shoulders in order to stretch apart his collar bone until break falls into place’. (Patric Blomstedt *et al.* 2014)^[2].

Hippocrates described fracture clavicle, as early as 400 BC and recorded that it is impossible to maintain reduction without surgical fixation, similar observation have been made by many surgeons in the years to follow.

The Canadian Orthopedic Trauma Society (2007) A Multicenter, Randomized Clinical Trial found that A prospective clinical trial, 132 patients with a displaced midshaft fracture of the clavicle were randomized (by sealed envelope) to either operative treatment with plate fixation (sixty-seven patients) or nonoperative treatment with a sling (sixty-five patients). Operative fixation of a displaced fracture of the clavicular shaft results in improved functional outcome and a lower rate of malunion and nonunion compared with nonoperative treatment at one year of follow-up^[3].

Silvana De Giorgi *et al.* (2011) found that While conservative treatment remains the gold standard for minimally displaced clavicle fractures, in cases with severe dislocation of the

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focus, surgery may be indicated, depending on the clinical-instrumental characteristics of the case. The present study assessed the reliability of using the percentage shortening of the bone segment as a means of predicting the failure of conservative treatment of a clavicle fracture. Shortening of the bone by more than 9.7% should be the cut-off for predicting failure of conservative treatment ^[4].

Ilija Ban *et al.* (2012) found that five studies with a total of 365 patients were identified. Overall, the functional outcome (measured with the Constant score) was better in the surgically treated groups than in the conservatively treated groups. Likewise, union rates were higher in the surgical groups than in the conservative groups. Overall, complication rates were close to 30% in the surgically treated groups compared with 47% in the conservatively treated groups.

Sachin Y. Kale *et al.* (2013) found that 17 patients were treated conservatively while 16 operatively. 23 (69.7%) had excellent or good functional outcome at 4 weeks irrespective of the treatment. The patients in the operative group who showed excellent results were significantly more than that in the conservative group ($p = 0.0324$). Average union time in the conservative group was 9.4 weeks, more than the 7.8 weeks seen in the operative group. Mal-union was present in 7 of 17 patients treated conservatively. Superficial infection, implant failure and keloid formation were seen in one patient of Operated group, Clavicle fractures managed operatively had better Outcome with lesser post-operative complications ^[5, 6]

Methodology

Inclusion Criteria

- Age between 16 years to 60 years.
- Within 2 weeks of fracture clavicle.
- Displaced fracture of Mid shaft clavicle
- Shortening > 2 cm
- Segmental fractures
- Bilateral clavicle fracture
- Clavicular fracture associated with other injuries.
- Grade I and II compound fractures.

Exclusion Criteria

- Age below 16 years and above 60 Years.
- Preexisting pathology in shoulder or elbow or both.
- Fracture more than 2 weeks.
- Fracture of lateral end clavicle and medial end.
- Scapular malposition and winging on initial examination.
- Floating shoulder.
- Patient who do not give consent.
- Grade III compound fractures.

Patients were clinically examined; first aid was given in the form of, cuff and color sling, analgesics, antacids and was subjected to A-P view, Lardot view radiograph of full length clavicle to decide the plan of definitive management. If needed CT scan and MRI were also taken.

Those requiring surgery were classified as per Allman classification and investigated for fitness for anesthesia and surgery.

The relevant data were recorded in the working Proforma.

Selected patients were randomly divided in Group I and Group II. Patients of group I were treated by, closed/open reduction & internal fixation by TENS and Group II by open reduction & internal fixation by plate & screws. Patients were followed periodically at 2 weeks, 6 weeks, 3, 6, 12 months, 18

months and 24 months.

Results were evaluated by Constant scoring system given by Murley (1987)

Results

Table 1: Sex Distribution

Sex	Group I	%	Group II	%
Male	21	67.74	19	61.29
Female	10	32.26	12	38.70
Total	31	100	31	100

Sex distribution was quite similar in both group of patients with 67.74% male in group I and 61.29% male in group.

Table 2: Associated Injuries

Associated injuries	No. of cases	Percentage
Fracture of other bone	6	9.67%
Head and facial injury (CCI)	5	8.06%

Six patients had associated skeletal injury three patient had fracture ribs, two had fracture femur one had polytrauma (fracture right clavicle, left ulna, right femur). Five cases had CCI (crainio-cervical injury) Most of the cases had no other associated injuries. no associated neurovascular injury were noted.

Table 3: Shows Post-Op Hospital Stay

Duration (in days)	Group I	%	Group II	%
1-3	27	87.09%	2	6.45%
4-5	3	9.67%	19	61.29%
6-7	1	3.22%	10	32.25%
Total	31	100%	31	100%

The table shows that, 27 patients of group I, treated by closed method were discharged within 3 days of surgery. In group II our protocol was to give I.V. antibiotics for 5 days but 2 patients, were discharged due to personal request.

Table 4: Shows Post-Op Complications

Complications	GP I	%	GP II	%
Superficial infection	5	16.12	3	9.67
Deep infection	--	--	2	6.45
Neurovascular injury	--	---	--	---
Non union	2	6.45	2	6.45
Ugly scar	----	----	3	9.67
Implant protuberance	---	---	2	6.45
Pin migration	2	6.45	---	----
Implant failure	---	----	----	----
No complication	22	67.74	19	61.29
Total	31	100	31	100

Overall plate had more intra op and post op complications like more blood loss, more operative time, superficial infections, deep infections, implant protuberance, ugly scar, difficult implant removal than TENS fixation. In this study nonunion was equal in both TENS and plate fixation groups.

Discussion

Lenza M *et al.* (2013) found that surgery may not improve upper arm function or pain one to two years later but may slightly reduce the number of fractures that did not heal or that healed incorrectly compared with conservative treatment Ajay Shukla *et al.* (2014) found that 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 [7].

Lenza M *et al.* (2016) found that Three studies (296 participants) comparing the figure-of-eight bandage versus an arm sling found similar shoulder function in the two groups at the end of follow-up. Although data from two studies did not show a difference in pain at two weeks after injury, the third study reported more pain and discomfort in people in the figure-of-eight bandage group. One participant was recorded as having surgery for a complication. None of the three studies found differences in time for fracture healing, adverse outcomes or time to return to school or work activities [8].

David Sheps *et al.* (2016) found that mid-shaft clavicle fractures were treated conservatively with benign neglect because surgical management was considered fraught with complications and poor outcomes. Only rare open fractures or ones with risk of skin compromise were treated surgically. Patients initially treated with benign neglect returned for follow-up treatment only on those infrequent occasions when a clear non-union of the fracture developed. Prospective studies of conservative management of mid-shaft clavicle fractures revealed the following [9]:

- Nonunion rates of between 15% and 20%.
- Objective shoulder strength loss between 18% and 33%.
- Residual sequelae at 6 months post Injury of 42%.

“Earlier the indications of surgery was very limited to some demanding cases of compound fracture, fragment causing tenting of overlying skin and demanding patient of fresh clavicular fracture who cautious of their figure. (Cosmetic reasons)”.

Kona *et al.* (1990), treated 19 patients of fracture clavicle and reported that, K-wire fixation should not be recommended for type II distal fracture clavicle.

Ballmer *et al.* (1991) and Yamaguchi *et al.* (1998) reported their results using indirect coraco-clavicular fixation in lateral end clavicle fracture with a Bosworth type screw in a small series of patients. They achieved union in all patients and concluded that this is a safe and easy technique to treat such fractures. They also recommended routine screw removal at second surgery.

According to Poigenfurst J *et al.* (1992) plating of acute mid shaft clavicle fractures is advocated as the preferred fixation method.

Poigenfurst J *et al.* (1992) treated 131 mid shaft clavicle fractures by open reduction and internal fixation by Plates in 129 patients. There was no bony infection or infected pseud arthrosis .Four clavicles fractured after removal of the plate and five operations led to pseud arthroses which were successfully treated by reoperation. He also found that radiological and clinical results in the majority of the re-examined patients were excellent [10].

Nordqvist *et al.* (1994) found the incidence of clavicle fracture was Seventy-six percent of the fractures were classified as Allman Group I.

Botsman, Manninen *et al.* (1997) the objective of this study was to evaluate the drawbacks and pitfalls of the plate fixation in clavicle fracture. 130 consecutive adult patients with severely displaced fresh fractures of the middle third of the clavicle who were treated by open reduction and internal fixation using AO/ASIF plates. Seventy-nine patients had an uneventful recovery, whereas 24 (23%) suffered one or several complications. The major complications included

deep infection, plate breakage, nonunion, and refracture after plate removal. The most common of the minor complications was plate loosening resulting in malunion [11].

Wu CC, Shih CH *et al.* (1998) found that intramedullary nailing may have a higher union rate with a lower complication rate than plating ($p>0.05$). At least in common situations, it is not inferior to plating. Whenever possible, therefore, intramedullary nailing should be used preferentially to treat clavicular aseptic nonunion without previous operative treatment. Nevertheless, both techniques have relatively higher nonunion rates in the treatment of clavicular nonunion than in the treatment of other long-bone nonunion

Siegfried Wentz, *et al.* (1999) 22 semi-professional athletes (14 men and 8 women), aged 18–33 years with a non-union of the middle third of the clavicle were treated operatively by reconstruction plating and bone grafting. In all patients, initially a figure-of-eight strap or a sling was used for immobilization and no radiographic union was documented within 5 months. In all athletes, radiographic consolidation was achieved after an average of 14 weeks (range, 11–16 weeks) and the average increase in the Constant and Murley Score was from 79 points preoperatively to 97 points after surgery. He also noticed no operative or postoperative complications occurred and all athletes returned to their sports [12].

Conclusion

Over all plate had more intra op and post op complications like more blood loss, more operative time, superficial infections, deep infections, implant protuberance, ugly scar, difficult implant removal than TENS fixation. In this study nonunion was equal in both TENS and plate fixation groups.

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