Original Article

Journal of Orthopaedic Education
Volume 3 Number 2, July - December 2017
DOI: http://dx.doi.org/10.21088/joe.2454.7956.3217.15

Clinical Profile of Patients with Fractures of Middle Third of Clavicle

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Received: 03 October 2017, **Accepted on:** 12 October 2017

Abstract

Introduction: A weak spot in the clavicle is present at the midclavicular region, which accounts for most fractures occurring in this region. Numerous muscular and ligamentous forces act on the clavicle, and knowledge of these differing forces is necessary to understand the nature of displacement of clavicle fractures and why certain fracture patterns tend to cause problems if not reduced and surgically stabilized. *Methodology:* Patients of the age 18-60 years having closed fracture ofthe clavicle who are admitted were taken up for study after obtaining their written informed consent. The study was done in the Department of Orthopaedics. *Results:* Direct injury occurred in 12 patients (60%),among which 5 patients (25%) were due to road traffic accident and 7 patients (35%) were due to fall from bike. Six patients (30%) due to simple fall on shoulder and 2 patients (10%) due to indirect injury by fall on outstretched hand. *Conclusion:* Type 2 middle third fracture type-2B1 occurred in majority of patients.

Keywords: Clavicle; Middle Fracture; Displaced Fracture.

Introduction

In 1987, JB Jupiter and RD Leffert reported that all the etiological factors that were reviewed the extent of displacement of the original fracture was the most significant cause of non-union. Associated complications were limited mobility of the shoulder, neurovascular symptoms and thoracic outlet syndrome [1].

In 1997, James M. Hill et al, evaluated 242 consecutive fractures of the clavicle in adults which had been treated conservatively. Of these, 66 (27%) were originally in the middle third of the clavicle and had been completely displaced. They reviewed 52 of these patients at a mean of 38 months after injury. Eight of the 52 fractures (15%) had developed nonunion, and 16 patients (31%) reported unsatisfactory results. Thirteen patients had mild to moderate residual pain and 15 had some evidence of brachial plexus irritation. Of the 28 who had cosmetic complaints, only 11 considered accepting corrective surgery. No patient had significant impairment of range ofmovement or shoulder strength as a result of the injury. They found that initial shortening at the fracture of ≥20 mm had a highly significant association with nonunion ($p < 0.0001$) and the chance of an unsatisfactory result. Final shortening of 20 mm or more was associated with an unsatisfactory result, but not with nonunion. No other patient variable, treatment factor, or fracture characteristic had a significant effect on outcome. They recommended open reduction and internal fixation of severely displaced fractures of the middle third of the clavicle in adult patients [2].

In 2002, Iannotti MR et al., concluded that clavicles plated at the superior aspect exhibit Significantly greater stability than those plated at the anterior

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aspect. Also concluded that LCDC plate offers significantly greater biomechanical stabilitythan the reconstruction and DC plates [3].

In 2003, Michael McKee et al., reported that malunion following may beassociated with orthopaedic, neurologic, and cosmetic complications. Theyconcluded that in selected cases, corrective osteotomy results in a high degree of patient satisfaction and improves patient based upper-extremity scores [4].

In 2006, Michael McKee et al., concluded that although good results with minimal functional deficits have been reported following non operative treatment of clavicular fractures, surgeon based methods of evaluation may be insensitive to loss of muscle strength. They detected residual deficits in shoulder strength and endurance in this patient population, which may be related to the significant level of dysfunction detected by the patient-based outcome measures [5].

2007- In a multicenter, prospective trial by the Canadian Orthopaedic Trauma Society of displaced midshaft clavicle fracture, outcome and complication rates were compared for non-operative and plate fixation. Constant Shoulder scores and Disability of the Arm,Shoulder and Hand(DASH) scores were greatly improved inthe operative fixation group. Mean time to radiographic union was faster in the operative group than in the nonoperative group. There were lower rates of non-union in operative group than in non-operative group. Symptomatic malunion was present in none of the operative group. At 1 year after injury, the operative group patients were more likely to be satisfied with the appearance of the shoulder and with the shoulder in general than the non-operative group patients [6].

In 2007, Huang et al., concluded apex of the superior bow of the clavicle is typically located along the lateral aspect of the bone, whereas the medial aspect of the superior surface of the clavicle remains relatively flat, making it an ideal plating surface. They also opined that displaced midshaftclavicular fractures that are treated with plate fixation have better functional outcomes than those that are treated non-operatively [7].

In 2008, WgCdr V Kulshrestha reviewed the results of twenty cases of displaced comminuted midclavicular fractures, which were treated with primary open reduction and internal fixation with reconstruction plate placed over the superior surface of clavicle. All the fractures clinically united by eight weeks. As per Rowe criterion 12 had excellent, six good and two fair results. On an average patients had full functional recovery by four months. Primary internal fixation of displaced comminuted mid-shaft clavicular fractures leads to predictable and early return to function thus preventing unacceptably high complication rates of non-operative management of these fractures.

In 2008, Wun-JerShen M.D. et al., operated on 251 fresh completely displaced mid-third clavicle fractures in adults. The fractures were plated with a Mizuho C-type plate or an AO/ASIF 3.5 mm reconstruction plate. The mean time to radiographic union was 10 weeks. Seven patients (3%) developed nonunion. Healing withangulation occurred in 14 patients. Deep infection developed in one patient, and superficial infection in four cases; 21 patients reported soreness with changes in the weather and activity; 28 patients had residual skin numbness caudal to the incision. No patient had shoulder droop, and none had impairment of range of motion or shoulder strength. None developed new or late neurovascular impairment; 171 patients eventually had the hardware removed at an average 401 days post operatively. Overall, 94% were satisfied with the procedure. For completely displaced clavicle fractures in adults, plating is a reliable procedure.

Methodology

Patients of the age 18-60 years having closed fracture ofthe clavicle who are admitted were taken up for study after obtaining their written informed consent. The study was done in the Department of Orthopaedics.

Inclusion Criteria

- Male and female patients aged 18-60 years with closed displaced middle 3rdclavicular fracture who have given their consent for the procedure.
- Patients who are medically fit for surgery.
- Communited fractures of the clavicle.

Exclusion Criteria

- Open fractures of the clavicle.
- Undisplaced fractures.
- Patients <18 yrs and >60yrs.
- Patients medically unfit for surgery.
- Patients not willing for surgery.
- Patients with neurovascular deficits.

Results

The study consists of 20 patients with displaced fracture of clavicle middle third, which were operated by precontoured locking plate and screws.All patients were available for follow up and they were followed every 6 weeks. Results were analyzed both clinically and radiologically.

Among 20 patients, 9 patients (45%) were in the age group of 20-30 years. youngest patient was 19years and oldest was 60 years. Average age was 32.65years.

Majority of patients studies were male, 18 patients(90%) and only 2 patients were female (10%).

Direct injury occurred in 12 patients (60%), among which 5 patients (25%) were due to road traffic accident and 7 patients (35%) were due to fall from bike. Six patients (30%) due to simple fall on shoulder and 2 patients (10%) due to indirect injury by fall on outstretched hand.

In this study, there were 11 patients (55%) with left sided fracture and 9 patients (45%) with right sided fracture.

In this study Robinson classification was followed.

Type 2 middle third fracture type-2B1 (displaced with simple or single butterfly fragment) occurred in 16 patients (80%) and type-2B2 (displaced with comminuted or segmental) fracture occurred in 4 patients (20%).

Among the 20 patients, 3 patients (15%) had associated injuries among them 1 patient (5%) had fracture shaft femur with fracture of both bones leg, one patient (5%) had supracondylar humerus fracture with radial nerve palsy and 1 patient (5%) had contralateral Scaphoid fracture.

Interval-injury to operation (days) of patients studied All patients were operated operated after fitness for surgery was taken. Twelve patients under general anaesthesia and 8 patients under regional block.

Table 1: Age distribution of patients studied

Age in years	No. of Patients	%
<20	1	5.0
20-30	9	45.0
31-40	7	35.0
>40	3	15.0
Total	20	100.0

Table 2: Gender distribution of patients studied

Gender	No. of Patients	%
Female	2	10.0
Male	18	90.0
Total	20	100.0

Table 3: Mode of Injury of patients studied

Mode of Injury	No. of Patients	%
FFB	7	35.0
FOS	6	30.0
RTA	5	25.0
FOH	2	10.0
Total	20	100.0

Table 4: Side involved of patients studied

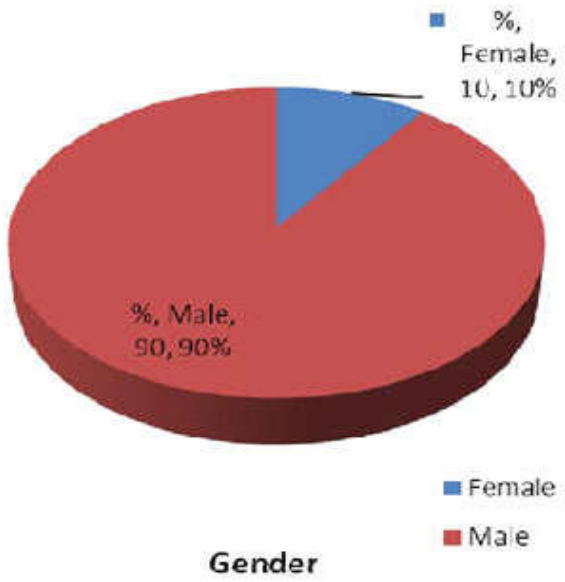
Side	No. of patients	%
Left	11	55.0
Right	9	45.0
Total	20	100.0

Table 5: Type of Injury of patients studied

Type of Injury	No. of Patients	%
2B1	16	80.0
2B2	4	20.0
Total	20	100.0

Table 6: Associated Injury of patients studied

Associated Injury	No. of patients (n=20)	%
No	17	85.0
Yes	3	15.0
Femur BB leg	1	5.0
SCH+RNP	1	5.0
Scaphoid	1	5.0



Discussion

Among 20 patients, 9 patients (45%) were in the age group of 20-30 years. Youngest patient was 19 years and oldest was 60 years Average age was 32.65 years.

In Bostmanet al [8] study patients average age was 33.4 years and the youngest patient age was 19 years and oldest patient age was 62 years.

In Cho et al [9] study, in reconstruction plate group the mean age was 45 years (range 22-70 years) and that of locking compression plate group was 46 years (range 19-69 years).

In Van Beek et al [10] study, average age of patients in precontoured plating group was 36 years (range 13-68years) and in non contoured plating group was 28.9 years (range 19-50years).

Majority of patients studies were male,18 patients (90%) and only 2 patients were female (10%)

In Bostmanet al [8] study also commonly males were affected, 76 patients (73.79%) compared to 27 female patients (26.21%).

In Cho et al [9] study, the reconstruction plate group 12 male and 7 female patients and in locking compression plate group it was 17 male and 5 female patients. In Van Beek et al [10], study, in precontoured plate group 22 male and 6 female patients and in non contoured plate group it was 10 male and 4 female patients.

Direct injury occurred in 12 patients (60%), among which 5 patients (25%) were due to road traffic accident and 7 patients (35%) were due to fall from bike. Six patients (30%) due to simple fall on shoulder and 2 patients (10%) due to indirect injury by fall on outstretched hand.

In Bostman et al [8] study the mechanism of injury was due to fall from thetwo wheeler in 38 Patients (36.8%), Slipping and fall in 24 Patients (23.30%), motor vehicle accident in 19 patients (18.45%) and sports in injury 22 patients (21.36%).

In Cho et al [9] study, in reconstruction plate group there were 13 patients who sustained road traffic accident, 3 patients with slip down, 1 patient with sports injury, 1 patient with fall down and 1 patient with miscellaneous mode of injury. In locking compression plate group there were 7 patients with road traffic accident, 3 patients with slip down, 1 patient with fall down and 1 patient with miscellaneous mode of injury.

In VanBeeket al [10] study, the most common mechanism of injury was fall in 19 patients, sports

related injuries in 17 patients and motor vehicle trauma in 6 patients.

Among the 20 patients, 3 patients (15%) had associated injuries among them 1 patient (5%) had fracture shaft femur with fracture of both bones leg, one patient (5%) had supracondylar humerus fracture with radial nerve palsy and 1 patient (5%) had contralateral Scaphoid fracture.

In Bostmanet al [9] study, there were no associated injuries.

In Cho et al [9] study, an associated injury was found in 16 cases: hemothorax and rib fracture in 5 cases, scapular fracture in 3 cases (floating shoulder was observed in 2 of them) and rotator cuff tear in 1 case.

In Van Beek et al [10] study, there were no associated injuries.

This is comparable to Bostman et al [8], Cho et al [9] study and Van Beek et al [10] study which also showed all their patients were closed fractures.

Conclusion

In this present study, Robinson Type- 2B1 (displaced with simple or butterfly fragment) were common and there were 16 patients (80%), Type- 2B2 (displaced with comminution) occurred in 4 patients (20%).

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