

ORIGINAL RESEARCH

**A Study of Functional Outcome of Clavicle Fractures
Osteosynthesis with Plating**

Ramavath Arjun Naik¹, L. Madhu², Nagendra Babu³, Moola Sohith Mahadeva Reddy⁴

¹MBBS, MS (Orthopaedics), Assistant Professor, Government Medical College & Hospital, Nalgonda

²MBBS, MS (Orthopaedics), Assistant Professor, Government Medical College & Hospital, Nalgonda

³MBBS, MS (Orthopaedics), Senior Resident, Government Medical College & Hospital, Nalgonda

⁴Junior Resident, Government Medical College & Hospital, Nalgonda

ABSTRACT

Background: The traditional view that the vast majority of clavicular fractures heal with good functional outcomes following non operative treatment is no longer valid. Recent studies have identified a higher rate of non-union, late neurovascular compromise and specific deficits of shoulder function in subgroups of patients with these injuries who are treated by conservative means. To study the functional outcome osteosynthesis of clavicle fractures using anatomical Locking compression plate.

Materials and Methods: Study was conducted on 20 patients with displaced/comminuted clavicle fractures. All the patients were treated by open reduction and internal fixation with 3.5mm anatomical LCP plate and screws. Functional outcome was recorded at regular intervals postoperatively at 6,12 & 24 weeks according to Constant Murley scoring system.

Results: According to Robinsons classification 2 were 1B1 type, 6were 2B1,8 were 2B2 and 4were 3B1 type. Range of motion was well maintained in all patients. The values were as of the normal contralateral shoulder, 82% of patients having >90% of the normal function (Excellent grade) at last follow up.

Conclusion: Clavicle fractures should therefore be viewed as a spectrum of injuries with diverse functional outcomes, each requiring careful assessment and individualized treatment, and plate osteosynthesis should be preferred for the treatment of indicated clavicle fractures in young active individuals.

Key Words: Clavicle fractures, Robinson's classification, Murley scoring system, Osteosynthesis.

Corresponding Author: Dr. Ramavath Arjun Naik, MBBS, MS (Orthopaedics), Assistant professor, Government Medical College & Hospital, Nalgonda

INTRODUCTION

The clavicle is a unique bone that connects the axial skeleton to the shoulder girdle via the sternum medially and the scapula laterally and helps in the movements at shoulder girdle. Clavicle fracture is a common traumatic injury around shoulder girdle due to its subcutaneous position caused by either low-energy or high-energy impact. The traditional view that most of the clavicular fractures heal with good functional outcomes following non operative treatment is no longer valid.^[1] Recent studies have showed a higher rate of nonunion and

shoulder dysfunction in subgroups of patients with clavicle fractures. Because of this, these fractures should therefore be considered as a spectrum of injuries with various functional outcomes, each requiring cautious assessment and individualized care.^[2]

Fracture of the clavicle is common, accounting for 5 to 12% of all fractures. About 70 -76% of these fractures are in the middle third of the bone, where the typical compressive forces applied to the shoulder and the narrow cross section of the bone combines and results in bony failure.³ 21-28% are distal third fractures. The proponents of early fixation of fresh clavicular fractures to prevent complications like mal union and nonunion emphasize the value of accurate reduction and rigid fixation for quick pain relief and promoting early functional recovery. Persons with high activity level will hesitate to accept prolonged recovery and impaired shoulder function, therefore may require more aggressive treatment of clavicle fractures.^[4]

Prompt fixation of these clavicle fractures permits increased patient comfort, and early shoulder mobility. In cases of associated scapula fractures, fixation of the clavicle provides restoration of shoulder mechanics leading to improvement of function. Operative treatment of displaced clavicular fractures can be achieved successfully using plates or intramedullary implants like rush pins, Kirshner wires or nails. Open reduction and internal fixation with plating provides rigid fixation, early functional recovery and low rates of non-union, mal union.^[5]

The purpose of the study is to prospectively analyze the functional outcome of clavicular fractures treated by open reduction and internal fixation with plate osteosynthesis.

MATERIALS & METHODS

Type of study: Prospective observational study

Study Setting: Department of Orthopedics, Government Medical College & Hospital, Nalgonda

Duration of Study: One year (January 2021 to January 2022)

Sample size: 20 patients with clavicle fractures

Inclusion Criteria:

- An age between eighteen and sixty years.
- A completely displaced (>2cms) fracture of the clavicle (derived by clinical measurement).
- Comminuted fracture of the clavicle with inferior cortical defect.
- closed fractures
- fracture with skin tenting
- fracture with neurological deficit

Exclusion Criteria:

Patients were excluded from the study if they had

- An age of less than sixteen years or greater than sixty years.
- Pathological fractures.
- Undisplaced or minimally displaced clavicle fractures.
- open fractures

Study was conducted on 20 patients with displaced/comminuted clavicle fractures. All the patients were treated by open reduction and internal fixation with 3.5mm anatomical LCP plate and screws. Functional outcome was recorded at regular intervals postoperatively at 6,12 & 24 weeks according to Constant Murley scoring system. Patients were kept nil orally

for 4 to 6 hours post- operatively. Intravenous fluids were given as needed. Antibiotics were continued for 3 days. Analgesics and tranquilizers were given according to the needs of the patient. The operated upper limb was immobilized in an arm pouch. Check x-rays were taken to study the alignment of fracture fragments. The wound was inspected at 2nd postoperative day. Suture removal was done on 12th postoperative day. Patients were discharged with the arm pouch.

RESULTS

Table 1: Distribution based on Gender, side and mode of injury

Gender	Frequency	Percent
Female	1	5.0
Male	19	95.0
Side distribution	20	100.0
LT	8	40.0
RT	12	60.0
Mode of injury		
Fall on out stretched hand	6	30.0
RTA	14	70.0
Total	20	100.0

In our study among the twenty patients with clavicle fractures 19 were males (95%) and 1 was female (5%) with right side predominance (60%). Motor vehicle accidents were 14(70%) and fall on out stretched hand were 6(30%).

Table 2: Distribution based on Robinsons classification

Robinsons type	Frequency	Percentage
1B1	2	10.0
2B1	6	30.0
2B2	8	40.0
3B1	4	20.0
Total	20	100.0

According to Robinsons classification 2 were 1B1 type, 6were 2B1,8 were 2B2 and 4were 3B1 type.

Table 3: Distribution based on time of union

Time of union in weeks	Number of patients
15	4
16	8
17	5
18	1
20	2

Table 4: Follow Up

Time of follow up	Constant Murley score
6weeks	77.5
12 weeks	83
24weeks	91.5

All the patients were followed up at monthly intervals to assess fracture union clinically and radiologically. Functional outcome was recorded at 6, 12, 24 weeks according to Constant and Murley scoring system. The mean time for fracture union was 16.35 weeks (range from 8weeks to 24weeks). Most of the patients (82%) had constant shoulder score > 90 at last follow up.

Table: 5 Functional outcome assessed by CMS score

Functional out come	Number of patients
Excellent	17
Good	1
Fair	2
Poor	0

Range of motion was well maintained in all patients. The values were as of the normal contralateral shoulder, 82% of patients having >90% of the normal function (Excellent grade) at last follow up.

After the surgery, all patients were satisfied with their shoulder function. Between operated and normal clavicle there was mean length difference of 0.4 mm.

Of the 20 patients in regular follow-up all the patients had returned to their pre-injury levels of work and recreational activity. One patient had superficial wound infection which was subsided after adequate antibiotic coverage. None of the patients had Nonunion/Malunion, neuro vascular complications or refracture.

DISCUSSION

The advantages of internal fixation of clavicle fractures, which includes early pain resolution, early return of shoulder function and potentially early return to work makes it an appealing option for the treatment of displaced fractures in active individuals. Many different methods of operative fixation of clavicle fractures are present.^[6] Intramedullary pinning techniques have been associated with a high number of complications, such as pin migration and rotational instability and fixation with interfragmentary screws or wire sutures show insufficient immobilization.^[7] As a result, we prefer rigid fixation with a plate osteosynthesis which provides superior fracture stability and excellent clinical results in the treatment of acute fractures .

Late neurovascular compromise upto 6% was seen in patients treated conservatively due to non-union and excessive callus formation.^[8] In our study we had no transient neurological abnormalities. The range of motion was good and the mean constant score was above 90 in our study. On reviewing the literature we found patients treated conservatively had substantial residual disability of the affected shoulder with minimal loss of muscle strength.^[9]

The traditional view that the vast majority of clavicular fractures heal with good functional outcomes following non operative treatment is no longer valid. Recent studies have identified a higher rate of non-union, late neurovascular compromise and specific deficits of shoulder function in subgroups of patients with these injuries who are treated by conservative means. The encountered complications in our study were similar to other recent studies.^[10,11]

In our study, there was one superficial wound infection (5%). Different studies have shown infection rate upto 10% for plate fixation of displaced fracture. All cases were followed up regularly till 6 months. No patients sustained refracture or neurological complications.

Taking these above facts into account into account, we believe that operative treatment of acute clavicle fractures should be reserved for persons who wishes to return early to activity and who accept the risk of potential complications. Adequate rigid fixation of clavicle

fracture will allow the patient to return to the pre injury level early with no potential complications.

CONCLUSION

Internal fixation by plate osteosynthesis has the advantage of early pain resolution, early return of shoulder function and potentially early return to work. Clavicle fractures should therefore be viewed as a spectrum of injuries with diverse functional outcomes, each requiring careful assessment and individualized treatment, and plate osteosynthesis should be preferred for the treatment of indicated clavicle fractures in young active individuals.

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