Original Article

MANAGEMENT OF FRACTURE CLAVICLE BY PLATE AND SCREW FIXATION
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Abstract

Purpose: To evaluate radiological & clinical outcome of operative treatment of fractures clavicle

Methods: From July 2008 to June 2011 we performed ORIF on 12 adult patients, 9 men and 3 women, aged 20-48yrs with displaced midshaft and distal clavicle fractures at Narayanganj General Hospital, Aysha Memorial Hospital & other private Hospital of Dhaka.

Result: All 12 of the fractures healed within 9 weeks with the majority radiographically healed by 6 weeks. There were no malunion. There were no neurovascular complications and only one minor superficial infection treated with a 10 day course of oral antibiotics and local wound care. There was no evidence of hardware failure. All patients had returned to their previous activity level at approximately four months follow-up with full range-of-motion and strength in the affected extremity.

Conclusion: We believe that ORIF of displaced midshaft clavicle fractures is a safe procedure with excellent clinical outcomes. In the near future we plan to report function of this group using a standardized assessment metric with a minimum two year follow-up. The orthopedic surgeon should not be tempted to treat a fracture of the clavicle by open reduction merely because the patient or family objects to a bony prominence at the fracture.

Introduction

A fracture of the clavicle, one of the most common bony injuries, rarely requires open reduction. The traditional management of displaced (2 cm or more) midshaft clavicle fractures has been nonoperative1,2. Recent studies3,4,5,6,7,8, however, have demonstrated high rates of nonunion and symptomatic malunion with non-operative treatment. We report our experience with open reduction and internal fixation (ORIF) in 12 healthy adults with displaced closed midshaft clavicle fractures.

Fractures of the distal end of the clavicle can be relatively unstable and are prone to malunion and nonunion compared with more proximal clavicle fractures. The pull of the trapezius on the long proximal fragment causes displacement when the clavicle is free of the conoid and trapezoid ligaments distally. Non operatively, nonunion rates are high, quoted at 0.8% - 7%5. Open reduction and internal fixation should be considered in patients with distal clavicle fractures that are clinically unstable1,2,4,5,6,7,9.

Neer classification:

Type I: fracture of the distal clavicle (group II). The intact ligaments hold the fragments in place.
Methods
This prospective study was carried out from July 2008 until June of 2011. Total number of patient were 12. Out of 12, 9 were men and 3 women, aged 20-48yrs with displaced midshaft and distal clavicle fractures who met the following.

Inclusion criteria:
1. Acute midshaft clavicle fracture with 2 cm or more displacement,
2. Closed fracture,
3. No neurovascular deficit.

Exclusion Criteria:
1. Open fracture.
Ten patients had their procedure within the first week after their injury, and 2 patients had their procedure approximately 2 to 3 weeks later.

Place of study: Narayangonj General Hospital, some private Hospitals of Dhaka.

Surgical Technique
Informed consent was obtained by the operating surgeon, and it was explained to the patient that they might require a second surgery to remove implanted hardware, if symptomatic, once the fracture had healed. All patients underwent a general anesthetic and received a perioperative antibiotic (usually a 3rd-generation cephalosporin) within 30 minutes of the skin incision. A transverse incision was utilized overlying the clavicle. The fracture site was identified and all intervening soft tissue removed. The fracture was anatomically reduced and held in position with a clamp according to standard AO techniques. The plate was usually placed superiorly, but in two cases the plate was placed anteriorly as this seemed to give the best fit in those patients. At least three 3.5 mm cortical screws were carefully placed through the plate and through both cortices of the clavicle on either side of the fracture site.

Results
At the end of follow up the outcome were evaluated by the Constant scoring System (Table-1)\textsuperscript{10}. The score of all the patient were more than 75%. All 12 of the fractures healed within 9 weeks with the majority radiographically healed by 6 weeks. There were no malunions. There were no neurovascular complications and only one minor superficial infection treated with a 10 day course of oral antibiotics and local wound care.
There was no evidence of hardware failure. All patients had returned to their previous activity level at approximately four months follow-up with full range-of-motion and strength in the affected extremity.

40 year, male, Refracture of left clavicle after six months of first fracture.

Fig.-4: pre & post-operative X-ray

Fig.-5: Exposure of fracture site

Fig.-6: After fixation

Fig.-7: X-ray after two months

Fig.-8: X-ray after six months of surgery

Fig.-9: Scar
### Table-I
**Constant Scoring system**

| Pain                  | Points |
|-----------------------|--------|
| None                  | 15     |
| Mild                  | 10     |
| Moderate              | 5      |
| Severe                | 0      |

| Activity of daily Living points | Positioning | Points |
|---------------------------------|-------------|--------|
| Full work                       | Up to waist | 2      |
| Full recreation/ sports          | Up to xiphoid | 4     |
| Unaffected sleep                | Up to neck  | 6      |
|                                 | Up to top of head | 8     |
|                                 | Above head    | 10     |

Total for activity of daily living: 20

Points for forward and lateral elevation

| Elevation (Degrees) | Points |
|---------------------|--------|
| 0-30                | 0      |
| 31-60               | 2      |
| 61-90               | 4      |
| 91-120              | 6      |
| 121-150             | 8      |
| 151-180             | 10     |

External Rotation scoring

| Position                          | Points |
|-----------------------------------|--------|
| Hand behind head with elbow held forward | 2      |
| Hand behind head with elbow held back   | 2      |
| Hand on top of head with elbow held forward | 2      |
| Hand on top of head with elbow held back   | 2      |
| Full elevation from on top of head     | 2      |
| Total:                               | 10     |

Internal Rotation scoring

| Position                             | Points |
|--------------------------------------|--------|
| Dorsum of hand to lateral thigh      | 0      |
| Dorsum of the hand to buttock        | 2      |
| Dorsum of the hand to lumbosacral junction | 4      |
| Dorsum of the hand waist (3rd lumbar vertebra) | 6      |
| Dorsum of the hand to 12th dorsal vertebra | 8      |
| Dorsum of the hand to interscapular region (DV 7) | 10     |

Fig.10: At final follow up

Fig.-11: Pre-operative X-ray
Discussion

Beginning in the 1960’s with the classic papers by Dr. Neer and Rowe, most authors have recommended that ORIF of displaced midshaft clavicle fracture be avoided because of the high rate of union with non-operative treatment, high rate of failure with operative treatment, and the perceived high risk of neurovascular complications due to the close proximity of the underlying subclavian artery, vein, brachial plexus, and pleura. Over 20 years ago Jupiter and Leffert noted that fracture displacement of greater than 2 cm was associated with nonunion in their series of patients\(^\text{11}\). Since then, the treatment of displaced midshaft clavicle fractures has evolved over the past several years based on recent clinical studies demonstrating high rates on nonunion and symptomatic malunion with non-operative treatment\(^\text{5-8,12,13}\).

Our series of ORIF of 12 displaced midshaft clavicle fractures revealed operative treatment to be safe with excellent clinical outcomes and no serious complications.

In summary, we believe that ORIF of displaced midshaft clavicle fractures is a safe procedure with excellent clinical outcomes.

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