

Original Article

MANAGEMENT OF FRACTURE CLAVICLE BY PLATE AND SCREW FIXATION

Md. Fazlul Haque Qasem¹, Md. Subir Hossain², Khandaker Ehtesam Ahmed³, Imtiaz Faruk⁴

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 nonoperative^{1,2}. Recent studies^{3,4,5,6,7,8}, 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 unstable^{1,2,4,5,6,7,9}.

1. Junior Consultant, Orthopaedic Surgery, General Hospital Narayanganj
2. OSD, DGHS, Deputed to NITOR, Dhaka.
3. Resident, NITOR, Dhaka.
4. Assistant Professor, Department of Surgery, SSMC&MH, Dhaka

Correspondence to: Dr. Md. Fazlul Haque Qasem, Junior Consultant, orthopaedic surgery, General Hospital Narayanganj, E-mail: mfhqasem64@gmail.com

Received: 30 September, 2012 **Accepted:** 09 January 2013

Neer classification:

Type I: fracture of the distal clavicle (group II). The intact ligaments hold the fragments in place.

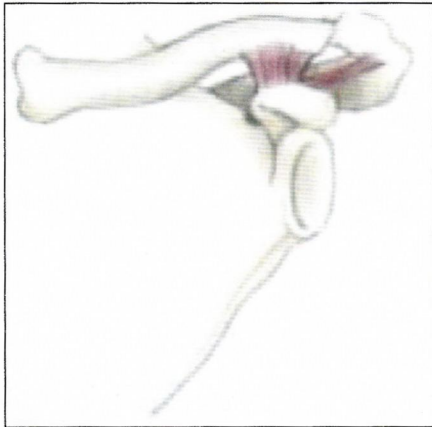


Fig.-1: (Type-IIA)

A type II distal clavicle fracture. In type IIA, both conoid and trapezoid ligaments are on the distal segment, while the proximal segment, without ligamentous attachments, is displaced

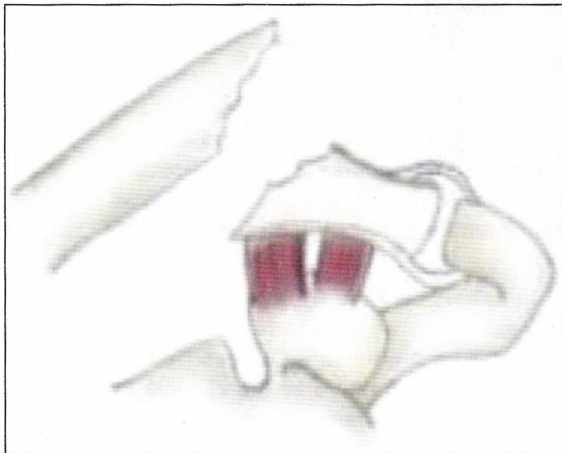


Fig.-2: (Type-IIB)

A type IIB fracture of the distal clavicle. The conoid ligament is ruptured while the trapezoid ligament remains attached to the distal segment. The proximal fragment is displaced.

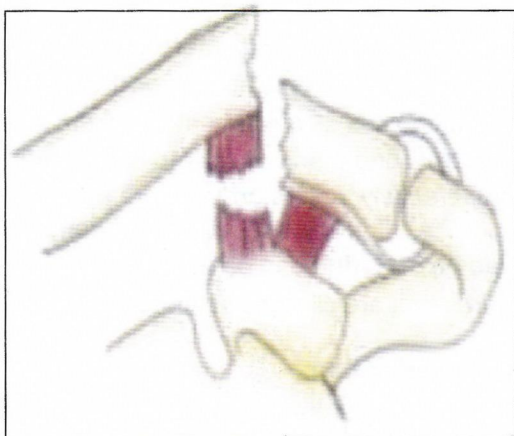


Fig.-3: (Type-IIB)

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)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

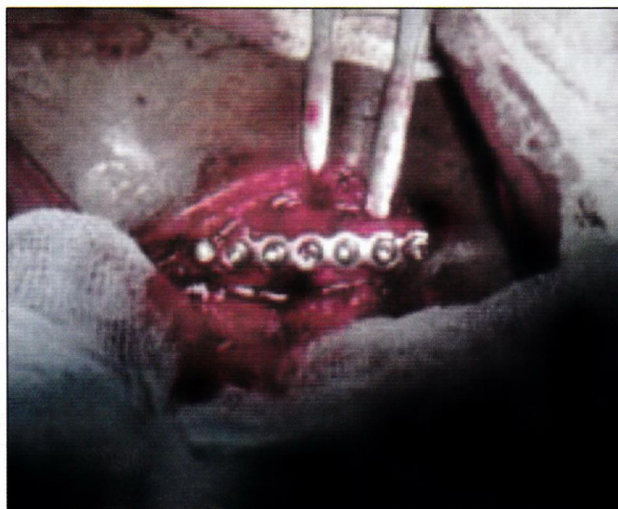


Fig.-6: After fixation

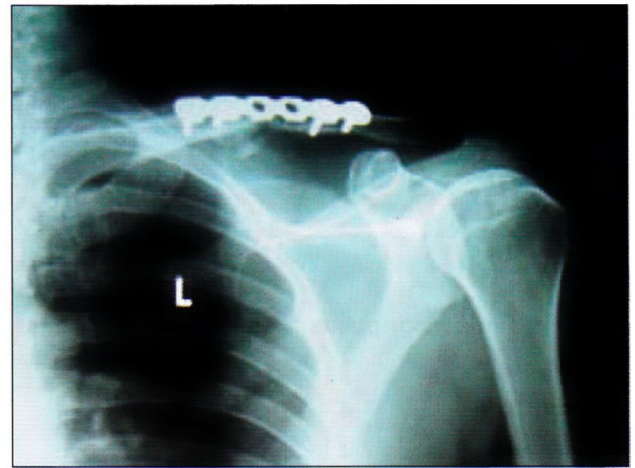


Fig.-7: X-ray after two months



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	
Activity Level			
Full work	4	Up to waist	2
Full recreation/ sports	4	Up to xiphoid	4
Unaffected sleep	2	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		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		Points	
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 (3 rd lumbar vertebra)		6	
Dorsum of the hand to 12 th dorsal vertebra		8	
Dorsum of the hand to interscapular region (DV 7)		10	



Fig.10: At final follow up

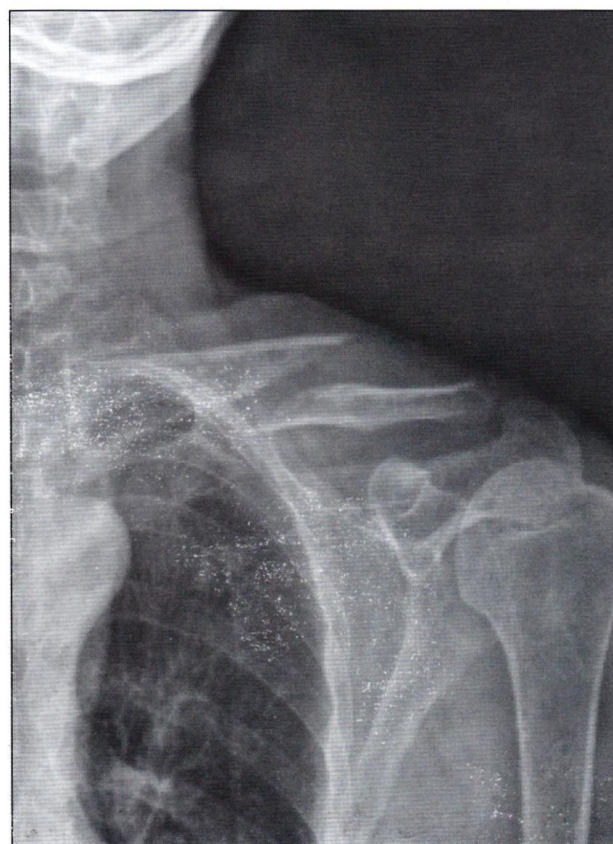


Fig.-11: Pre-operative X-ray

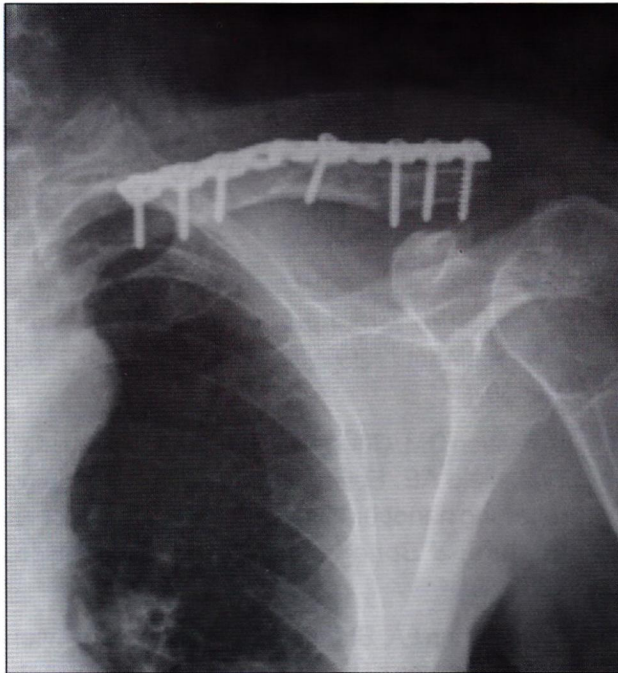


Fig.-12: Post operative X-ray



Fig.-13: Incision site after stitch off

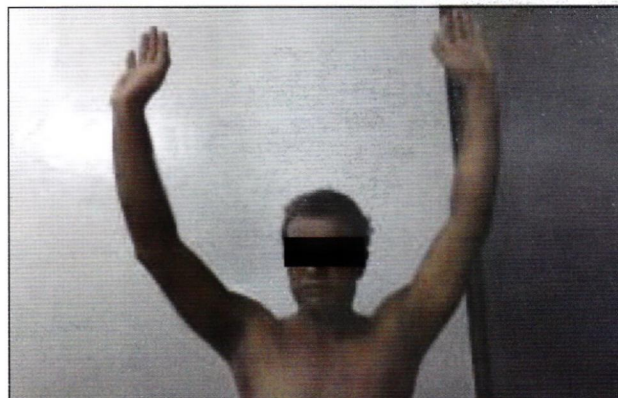


Fig.-14: At final follow up



Fig.-15: At final follow up

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 patients¹¹. 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^{3-8,12,13}.

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.

References

1. Neer CS. 2nd. Nonunion of the clavicle. *J AM Med Assoc.* 1960; 172: 1006-11.
2. Rowe CR. An atlas of anatomy and treatment of mid-clavicular fractures. *Clin Orthop Relat Res.* 1968; 58:29-42.
3. McKee MD, Wild LM, Schemitsch EH. Midshaft malunions of the clavicle. *J Bone Joint Surg Am.* 2003; 85: 790-7.

4. Canadian Orthopedic Trauma Society. Nonoperative treatment compared with plate fixation of displaced midshaft clavicle fractures. A multicenter, randomized clinical trial. *J Bone Joint Surg Am.* 2007; 89: 1-10.
5. McKee MD, Wild, LM, Schemitsch EH. Midshaft malunions of the clavicle. Surgical Technique. *J Bone Joint Surg Am.* 2004; 86 Suppl 1: 37-43.
6. Chen CE, Liu HC. Delayed brachial plexus neuropraxia complicating malunion of the clavicle. *Am J Orthop.* 2000; 29: 321-2.
7. Wick M, Muller EJ, Kollig E, Muhr G. Midshaft fractures of the clavicle with a shortening fo more than 2 cm predispose to nonunion. *Arch Orthop Trauma Surg.* 2001;121: 207-11.
8. McKee MD, Pedersen EM, Jones C, Stephen DJ, Kreder HJ, Schemitsch EH, Wild LM, Potter J. Deficits following nonoperative treatment of displaced midshaft clavicle fractures . *J Bone Joint Surg Am.* 2006; 88: 35-40.
9. Bostman O, Manninen M, Pihlajamaki H. Complications of plate fixation of displaced midclavicular fractures. *J Trauma.* 1997; 43: 778-83.
10. Constant CR and Murley AHG, A Clinical method of functional assessment of the shoulder. *Clin Orthop* 214:160-164,1987
11. Jupiter JB, Leffert RD. Non-union of the clavicle. Associated complications and surgical management. *J Bone Joint Surg Am.* 1987; 69: 753-60
12. Robinson CM, Court-Brown CM, McQueen MM, Wakefield AE. Estimating the risk of nonunion following nonoperative treatment of a clavicular fracture. *J Bone Joint Surg Am.* 2004; 86: 1359-65.
13. Kashif Khan LA, Bradnock TJ, Scott C, Robinson CM. Fractures of the clavicle. Current concepts review. *J Bone Joint Surg Am.* 2009; 91: 447-460.