

EVALUATION OF INCIDENCE OF POSTOPERATIVE INFECTION IN FRACTURE FIXATION OF CLAVICLE WITH LOCKING RECONSTRUCTION PLATE – RETROSPECTIVE STUDY

Original Article Orthopaedics

Sandeep Kumar^A, Vibhas Gupta^B

^A - Professor, Department of Orthopaedics, Hamdard Institute of Medical Sciences and Research, Jamia Hamdard, New Delhi

^B - Assistant Professor, Department of Orthopaedics, Chirayu Medical College & RC, Bhopal

Corresponding Author:

Dr. Vibhas Gupta
Assistant Professor,
Department of Orthopaedics,
Chirayu Medical College & RC,
Bhopal

Article submitted on: 22 September 2017

Article Accepted on: 21 October 2017

Abstract:

Most of the cases of the mid shaft of the fracture clavicle are treated conservatively by clavicular brace with cuff and collar sling. But some displaced fractures causing tenting of skin etc require open reduction and internal fixation. The aim of this study is to assess the incidence of infection, followed osteomyelitis of clavicular fractures with locking reconstruction plate.

Key words: Osteomyelitis, clavicle, reconstruction plate

Introduction

Most of the fracture clavicles are caused by fall on outstretched hand. Majority of these are mid shaft clavicular fractures and amongst them majority are displaced.^{1,2}

In ancient time most of clavicular midshaft fractures were treated conservatively with cuff & collar sling or clavicular brace. Most of the fractures treated operatively were having more non-union rate in comparison to conservative treatment.^{3,4} But at recent time treatment of midshaft clavicular fracture is plate fixation. It has advantage to provide stability of fracture and immediate mobility postoperatively.^{3,5,6} With the advent of precontoured anatomical plates main issue of discussion is type of plates used for fixation of clavicular fractures.⁷⁻⁹

Reconstruction plates are of two types, locking and nonlocking, which are frequently used for fracture fixation. Main characteristics of this plate is less stiffness due to which precontouring of plate is easy in all planes such that it fits into the shape of the clavicle.⁸

However there are certain complications associated with it like bending and breaking of these plates.^{10,11}

Several studies are conducted to compare the advantages of these plates over conventional plates but inadequate data is available about comparison rates.¹²⁻¹⁴

Potential complication of these plates is postoperative infection after midshaft clavicular osteosynthesis. The rate of infection according to literature varies from 0.4% to 7.8%.¹⁵⁻¹⁸

Duncan et al has conducted study with use of reconstruction plate and concluded that poor prognosis was

main concern for some patients.¹⁹

Material and Methods

It is multicentric study conducted between the period of April 2015 to May 2017. Written and informed consent was taken from the operative cases included in this study. This study was conducted on 4 patients having midshaft clavicular fractures. 26 males and 20 females between the age group of 38 years to 70 years were included in this study. Postoperatively broad spectrum antibiotics were given parentally for two days and oral antibiotics were given for 5 days. Shoulder arm pouch was given postoperatively. Retrospectively the medical records were retrieved from MRD. All the patients were noted for presence of infection after period follow up of 1 month, 3 months, and 5 months of surgery. Presence of pain, sinus, discharge and wound dehiscence were observed and taken into account as signs of inflammation. Debridement was done in cases of uncontrolled infection and broad spectrum antibiotics were given as per culture and sensitivity report. After treatment patients were followed for another 6 months, no any other complications were noted.

Discussion

The present was conducted to assess the risk of infection after the osteosynthesis of the midshaft clavicular fractures with reconstruction locking plates. In our study of 46 fracture patients 2 patients developed infection after follow up period. The incidence of infection was 4.3%. There were 1 case that presented with discharge and another patient had screw loosening. Antibiotics were prescribed in all the cases, there was 1 patient who underwent debridement

followed by plate removal. In a study conducted by Glide et al in 2014, failure rate was 8.5% was observed while managing 71 patients. There were 5.6% cases that required re operation.²⁰

In a study conducted by Shin et al over 125 patients they found the implant failure rate to be 12% with re-operation to be 8%.²¹ it is difficult to compare reconstruction plate with other types of plating system for the management of midclavicular fractures due to various reasons. The studies do not established the exact reason for re-operation, whether it was due to implant failure or due to complications like infection or elective.^{7,22,23} as per the study by Duncan et al¹⁹ if there is infection following surgical management of clavicular fractures then there should be thorough debridement of the dead and necrotic tissues. Then all the non-resorbable sutures and implants should be removed. In his study there was poor prognosis with regard to bony union after infection.

According to study by Hill et al there is a high risk of non union and abnormal shoulder function following conservative management of clavicle fractures.²⁴

The absolute indications for surgical management and internal fixation of midshaft clavicular fractures include more than 20mm shortening, discontinuity of overlying skin, loss of neurologic function, pathological fractures, vascular alterations and shoulder dislocations.²⁵

Reconstruction plate had notches that allows for easy bending according to the plane of the bone therefore it is widely used in complex reconstructions.

The limitation of our study is short follow up period.

Conclusion

In order to reduce incidence of malunion are non-union, open reduction and internal fixation is the best management choice for the displaced midshaft clavicular fractures. Reconstruction plated have the best adaptability, hence it is more useful for this purpose. The incidence of infection in our study was 4.3%.

References

1. Nordqvist A, Petersson C (1994) The incidence of fractures of the clavicle. *Clin Orthop Relat Res* 300:127–32
2. Postacchini F, Gumina S, De Santis P (2002) Epidemiology of clavicle fractures. *J Shoulder Elbow Surg* 11(5):452–456
3. Rowe CR (1968) An atlas of anatomy and treatment of midclavicular fractures. *Clin Orthop Relat Res*. 58:29–42
4. Neer CSII (1960) Nonunion of the clavicle. *JAMA* 172: 1006–1011
5. Mullaji AB, Jupiter JB (1994) Low-contact dynamic compression plating of the clavicle. *Injury*. 25:41–45
6. Kabak S, Halici M, Tuncel M, Aysarogullari L, Karaoglu S (2004) Treatment of mid-clavicular nonunion: comparison of dynamic compression plating and low-contact dynamic compression plating techniques. *J Shoulder Elbow Surg*. 13:396–403
7. Cho CH, Song KS, Min BW, et al. Operative treatment of clavicle midshaft fractures: comparison between reconstruction plate and reconstruction locking compression plate. *Clin Orthop Surg* 2010;2(3):154–9.
8. VanBeek C, Boselli KJ, Cadet ER, et al. Precontoured plating of clavicle fractures: decreased hardware-related complications? *Clin Orthop Relat Res* 2011;469(12):3337–43.
9. Robertson C, Celestre P, Mahar A, Schwartz A. Reconstruction plates for stabilization of mid-shaft clavicle fractures: differences between non-locked and locked plates in two different positions. *J Shoulder Elbow Surg* 2009;18(2):204–9.
10. Virtanen KJ, Remes V, Pajarinen J, et al. Sling compared with plate osteosynthesis for treatment of displaced midshaft clavicular fractures: a randomized clinical trial. *J Bone Joint Surg Am* 2012;94(17):1546–53.
11. Chen YF, Wei HF, Zhang C, et al. Retrospective comparison of titanium elastic nail (TEN) and reconstruction plate repair of displaced midshaft clavicular fractures. *J Shoulder Elbow Surg* 2012;21(4):495–501.
12. Celestre P, Roberston C, Mahar A, Oka R, Meunier M, Schwartz A, Celestre P, Roberston C, Mahar A, Oka R, Meunier M, Schwartz A (2008) Biomechanical evaluation of clavicle fracture plating techniques: does a locking plate provide improved stability? *J Orthop Trauma* 22(4):241–247
13. Eden L, Doht S, Frey SP, Ziegler D, Stoyhe J, Fehske K, Blunk T, Meffert RH (2012) Biomechanical comparison of the Locking Compression superior anterior clavicle plate with seven and ten hole reconstruction plates in midshaft clavicle fracture stabilisation. *Int Orthop* 36(12):2537–2543
14. Pai HT, Lee YS, Cheng CY (2009) Surgical treatment of midclavicular fractures in the elderly: a comparison of locking and nonlocking plates. *Orthopedics* 32(4)
15. Bostman O, Manninen M, Pihlajamaki H. Complications of plate fixation in fresh displaced midclavicular fractures. *J Trauma* 1997;43:778–83.
16. Verborgt O, Pittoors K, Van Glabbeek F, et al. Plate fixation of middle-third fractures of the clavicle in the semiprofessional athlete. *Acta Orthop Belg* 2005;71:17–21.
17. Poigenfurst J, Rappold G, Fischer W. Plating of fresh clavicular fractures: results of 122 operations. *Injury* 1992;23:237–41.
18. Shen WJ, Liu TJ, Shen YS. Plate fixation of fresh displaced midshaft clavicle fractures. *Injury* 1999;30: 497–500.
19. Duncan SF, Sperling JW, Steinmann S. Infection after clavicle fractures. *Clin Orthop Relat Res* 2005;439:74–8
20. Gilde AK, Jones CB, Sietsema DL, et al. Does plate type influence the clinical outcomes and implant removal in midclavicular fractures fixed with 2.7-mm anterior-inferior plates? A retrospective cohort study. *J Orthop Surg R* 2014;9:55.
21. Shin S-J, Do N-H, Jang K-Y. Risk factors for postoperative complications of displaced clavicular midshaft fractures. *J Trauma* 2012;72(4):1046–50.
22. Zlowodzki M, Zelle BA, Cole PA, et al. Treatment of acute midshaft clavicle fractures: systematic review of 2144 fractures: on behalf of the Evidence-Based Orthopaedic Trauma Working Group. *J Orthop Trauma* 2005;19:504–7.
23. Wijdicks FJ, Houwert M, Dijkgraaf M, et al. Complications after plate fixation and elastic stable intramedullary nailing of dislocated midshaft clavicle fractures: a retrospective comparison. *Int Orthop* 2012;36(10):2139–45.
24. Hill JM, McGuire MH, Crosby LA. Closed treatment of displaced middle-third fractures of the clavicle gives poor results. *J Bone Joint Surg Br* 1997;79:537–9.
25. Lazarus MD, Seon C. Fractures of the clavicle. In: Buchholz RW, Heckman JD, Court-Brown CM, eds. *Rockwood and Green's Fractures in Adults*, 6th ed. Philadelphia: Lippincott Williams & Wilkins, 2006: 1212–55.