Original Research Paper

Volume-10 | Issue-1 | January - 2020 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Orthopaedics

OUTCOME OF CONSERVATIVE VS SURGICAL MANAGEMENT IN MID SHAFT CLAVICLE FRACTURES.

Dr. Dinesh Kumar G*	Post Graduate Department Of Orthopaedics, Kurnool Medical College, Kurnool Andhra Pradesh, India *Corresponding Author
Dr. Upendram Vamsi Krishna	Post Graduate Department Of Orthopaedics, Kurnool Medical College, Kurnool, Andhra Pradesh, India
Dr. C. Maruthi Prasad	Post Graduate Department Of Orthopaedics, Kurnool Medical College, Kurnool, Andhra Pradesh, India

ABSTRACT

Aim: Recent studies of displaced clavicle mid shaft fractures treated conservatively shows non union and unsatisfactory results. Some studies shows better outcome when treated surgically. The aim of this stydy is compare the outcome of surgically and conservatively treated groups.

Patients and methods: this study was done on 36 cases of acute mid clavicular fractures in government general hospital ,Kurnool on 2018-2019 period. 18 cases treated conservatively with sling and 18 were surgically treated.outcome was assessed using constant score.patients were fallowed up for 1year.

Results: a total of 18 patients in conservatively treated group and 18 in surgical group completed 1 year fallowup.at 3months fallowup constant score was significantly better in surgically treated group comparing with conservative group. Complications of non union and malunion were high in conservative group.

Conclusion: fixation of displaced clavicle mid shaft fractures with pre contoured plate results in faster functional recovery and a high rate of union compared with non operative management.

KEYWORDS :

INTRODUCTION

Clavicle fractures account for 2.6% of all fractures and 45% to 65% of shoulder fractures. Medial and lateral 3rd fractures are rare and about 10% where as middle 3rd fractures are most common and includes 80%. Most of the minimally displaced fractures are treated conservatively.

The annual incidence of midclavicular fractures is 64 per 100000 population. Compound clavicle fractures are very rare and accont for <1%.

The incidence of non union in mid shaft clavicular fractures is 10-15%.most of the literature suggest conservative management only. Surgical management was not favoured because of the relatively frequent and serious complications.

In many clavicular fractures satisfactory results are noted with low complication rate using locking compression plate. Inspite of different surgical methods LCP which is precontoured to 's' shaped as per the curvature of the clavicle are most preffered.

This study aims to evaluate complications and functional outcome after conservative and surgically treated mid shaft clavicular fractures.

MATERIALS AND METHODS

This is a prospective study done in department of orthopaedics GGH Kurnool, in the period of January 2018 to August 2019. Total 36 patients were observed, 18 in each group.

INCLUSION CRITERIA:

1. Both males and females between 18-60yrs
2. Displaced simple middle third clavicular fractures(robinson type 2B1)

EXCLUSION CRITERIA:

1.Open Fractures
2.Fractures of lateral and medial third.
3. Undisplaced fractures.
4. Polytrauma patients.
5. Pathological fractures

SURGICAL TECHNIQUE:

- Patient positioned in modified bech chair position with one towel in the interscapular area. Ipsilateral upper limb is drapped from midarm region to hand.
- Incision of around 7 to 9cm was made in the anterior aspect of clavicle, centering over the fracture site.
- The incision is deepened and skin subcutaneous tissue and platysma were devided.
- The overlying fascia and periosteum were next devided. The fracture ends are made free from surrounding tissue.
- Miniumal soft tissue and periosteum dissection were done.
- Fracture is then reduced and plate was placed over the superior aspect of the clavicle.
- At the junction of the medial and middle 3rd of the clavicle the inferior surface of the clavicle is exposed in ordered to keep a protective instrument, while drilling to prevent injury to neurovascular structure underneath it.
- The locking compression plate was fixed to the medal and lateral fragment with locking screws/cortical screws after putting interfragmentary screw and atleast three screws in medial and lateral fragment were applied.
- After achieving adequate hemostasis, wound was then closed in layers and sterile dressing was given.

TREATMENT PLAN FOR PATIENTS WHO UNDERWENT CONSERVATIVE MANAGEMENT .

After confirming diagnosis with radiograph clavicle anteroposterior, patient was given figure of eight clavicle brace after wiping the axilla, shoulder and neck region. Brace was applied in sitting position with deep inspiration. After bracing peripheral pulses were checked to rule out axillary artery compression. Arm pouch support was given and discharge on same day or next day based on the general condition.

Patients were reviewed every week and radiographs were taken at 6weeks , 3months, 6months, and 1year.

FALLOW UP:

Regular fallowup every week for first two weeks followed by once in the 6th week 3rd 6th and 12th months. Assessment for tenderness , instability, deformity, and shoulder movements. The functional outcome were assessed by CONSTANT AND MURLEY'S SCORE at followup period.

RESULTS

The present study consists of 36 patients, among which 18 patients of fresh

fracture of the mid-third clavicle treated surgically with clavicular locking compression plate & screws and 18 patients who were treated conservatively with figure of eight clavicle brace and arm pouch/sling between January 2018 to August 2019.

33 patients were available for follow-up and they were followed up for 12 months at regular intervals. Results were analyzed both clinically and radiologically.

MODE OF INJURY:
Out of the 36 patients that were included in the study, 26 patients(72.2%) sustained fracture as a part of a Road traffic accident. 10 patients sustained fracture due to direct fall from height (27.8%).

AGE:
The distribution of age in surgical group ranges from 25 to 59 years. The mean age in the surgical group was 45.11 years and a SD of 8.123 years. The distribution of age in conservative group ranges from 18 to 64 years. The mean age in the conservative group was 45.33 years and a SD of 13.578 years.

INVOLVED SIDE:
In our study most of the cases treated are right sided invoivement in both surgical as well as conservative group.

Comparison of Constant & Murley score between surgical and conservative group
Constant & Murley score at 6 weeks, at 3 months, at 6 months and at 12 months were significantly higher in surgical group than conservative group. There was a statistically significant difference in Constant & Murley score at 6 weeks, at 3 months, at 6 months and at 12 months between surgical group and conservative group. The objective variables are range of motion and strength which give a total of 65 points. And finally grading of Constant Shoulder Score measured by >30 Poor, 21-30 Fair and 11-20 Good has been explained.

Constant & Murley score	Surgical Group		Conservative		T value	P value
	Mean	SD	Mean	SD		
At time of injury	29.44	2.81	28.22	1.8	1.55	0.13
At 6 weeks	56.78	5.53	44.89	4.29	7.19	-
At 3months	71.11	5.91	67.56	3.72	2.15	0.03
At 6months	80.11	7.68	73.11	4.51	3.33	0.02
At 12months	85.5	6.79	77.88	3.9	3.98	-

COMPLICATIONS:

Complications	Surgical Group		Conservative	
	Frequency	Percentage	Frequency	Percentage
No Complications	12	66.6	7	38.9
Implant Failure	3	16.6	0	0
Infection	2	11	0	0
Shoulder Stiffness	1	5.6	4	22.2
Delayed Union	0	0	3	16.7
Non Union	0	0	4	22.2

DISCUSSION
The results of present study of patients with middle third clavicle fractures is compared with the results of standard literature. The commonly compared studies are Bostman et al [33] study which treated 103 patients with only middle third clavicle fractures, by early open reduction and internal fixation with plate and screws Cesare Faldini [31]

et al study was also used to compare the results, where 100 patients with a clavicle mid shaft fracture were treated by figure of eight clavicle brace.

In a study conducted to analyze the results of conservative treatment by Hill et al [14] in 1997, Nordqvist et al10 in 1998 and Robinson et al65 in 2004 found poor results following conservative treatment of displaced middle third clavicle fracture. Previously, mal-union of the clavicle (which is typical with displaced fractures) was thought to be of radiographic interest only and required no treatment.

But now clavicular mal-union is regarded as a distinct clinical entity with radiographic, orthopaedic, neurologic, and cosmetic features. Nowak et al. examined the late sequelae in 208 adult patients with clavicular fractures and found that, at ten years after the injury, ninety-six patients (46%) still had symptoms despite the fact that only fifteen (7%) had a nonunion16. When it involves a young patient any compromise in shoulder function due to mal-union/nonunion of clavicular fracture severely hampers his employability. Patient today expect a rapid return to pain free function following a fracture .Many recent published articles document the success of open reduction and internal fixation for nonunion of displaced clavicle fractures with low complication rates. Most of these authors used plate fixation to treat these patients.

In our study we compared two accepted treatment modalities of fracture mid third clavicle called open reduction and plating with locking compression plate and conservative treatment with figure of eight clavicle brace in terms of outcome

AGE INCIDENCE:
In our study, the average age of patients with fracture mid third clavicle was found to be 45.11 in surgical group and 45.33 in conservative group. The youngest patient was of 18 year for conservative and 25 year for surgical group. The oldest patient in surgical group was 59 years old and conservative group it was 64 years.

In Bostman et al study patients average age was 33.4 years and the youngest patient age was 19 years and oldest patient age was 62 years. In Cesare Faldini [31] et al study, patients average age was found to be 32 years ranging from 18 to 67 years old.

In all these studies, it was found that fracture midthird clavicle occurs in patients who are young and active.

SEX INCIDENCE:
In our study, out of 36 patients, 16 were male(44%) and 20 were female(56%). Number of male patients in surgical group was 7 while in conservative group it was 9. The number of female patients were 11 and 9 in surgical and conservative group respectively. In Bostman et al [33]study 76 Patients (73.79%) were males compared to 27 females Patients (26.21%).In Cesare Faldini [31] et al study, out of 100 patients 78 were males and 22 were females.

All these studies show a female predominance in fracture mid-third clavicle occurrence.

TIME INTERVAL FOR TREATMENT:
All of our patients allotted to operative group were operated on the immediate next day of presentation. Patients in the conservative group were given bracing on the day of presentation it self.

In Bostman et al [33] study all the patients were operated within 3 days of injury.

In Cesare Faldini [31] et al study all patients were given figure of eight clavicle brace on the day of examination itself.

COMPLICATIONS:
NONUNION: In my study, no patient had non-union among the operative group and 4 patients (22, 2%) had non-union among the conservative group. among these 1 patients underwent open reduction with clavicular plate and bone grafting for nonunion.

In Bostman et al [33] study, no patients went for nonunion. In a study by Hill et al.[14] in non-operatively treated fracture clavicle non union rate reported was 15%.

According to Poigenfurts J et al[26] nonunion rate in patients underwent operative management was 2.2% .

IMPLANT BREAKAGE: In our study 3 patients had implant failure in the surgical group. Among them one patient had history of fall and implant failures (5.6%).One patient came with implant failure associated with RTA (5.6%). one patient came with implant failure and non union (5.6%).

INFECTION:- In our study, two patient (11%) in operative group had superficial skin infection. It was treated with oral antibiotics for 5 days and it got cured.

In Bostman et al study 33, the infection rate was found to be 7.8%

FUNCTIONAL OUTCOME:
The functional outcome was measured as per constant and murley

score at the time of injury, at 6 weeks, at 3 months, 6 month and 12 month. Constant and murley score at 6 weeks, 3 months, 6 months and 12 month were significantly better in surgical group than conservative group.

In a randomized control study[23] by Canadian orthopaedic trauma society, it was found that Constant score and DASH Scores are significantly better in surgical group at 6 weeks, 12 and 24 weeks than conservative group.

The main advantage of surgical treatment of mid-third fracture clavicle with plate is that it gives immediate pain relief, early shoulder movements less chance of non-union and early return to work compared to conservative treatment.

CONCLUSION

In this study 36 patients with mid-third fracture clavicle who presented to our hospital between January 2018 to august 2019 (18 months) were randomly selected into two groups with 18 patients in each group. 33 patients were followed up for 12 months at regular intervals. The patients functional outcome were measured using Constant and Murley scoring system and it was found that patient treated surgically had significantly better functional outcome at 6 weeks, 3 months, 6 months and 12 months respectively when compared to conservative group.

The complications we faced in surgical group were 2 cases of infection, 2 cases with implant failure in which surgical group and four cases of non union in conservative group which were in par with the non-union rates in standard literatures. There was also two case of superficial skin infection in surgical group.

It was observed that patients who underwent surgical treatment had better functional outcome in terms of early ROM and so return to work was earlier compared to conservative group.

According to present study, surgery can be recommended over conservative treatment in patients with displaced mid-third fracture clavicle.

REFERENCES

1. Egol KA, Zuckermann JD. Handbook of Fracture. LWW .4th edition Handbook of Fracture; 242,477,439.
2. Robert Bucholez, James D Heckman, Charles Court- Brown, Rockwood Green's Fractures In Adults Volume 1 6th Edition 2006, pg 1213-16.
3. Schiffer G, Faymonville C, Skouras E, Andermahr J, Jubel A : Midclavicular fracture: Not just a trivial injury - currenttreatment options.Dtsch Arztebl Int 2010; 107(41);711-7.
4. Wun-Jer Shen M.D. Tsung-Jen Liu M.D, Young-Shung Shen M.D. Po-Cheng Orthopaedic Institute, 100 Po-Ai 2nd Road, Kaohsiung, 813, Taiwan. Plate Fixation Of Fresh Displaced Midshaft Clavicle Fractures,/ Bone Joint Surg[Br]2008;90- B.1495-B
5. S.Terry Canale, James H. Beaty, Campbell's Operative Orthopedics Volume 3, 1 llh Edition, pg 3371-76.
6. Stegeman Et Al. Displaced Midshaft Fractures Of The Clavicle: Non- Operative Treatment Versus Plate Fixation (Sleutel-TRLAL). A Multicentre Randomised Controlled Trial. BMC Musculoskeletal Disorders 2011,12: 196.
7. N. Modi, A.D. Patel, P. Hallam Norfolk And Norwich University Hospital NHS Foundation Trust,Norwich,UK. Outcome Of 62 Clavicle Fracture Fixations With Locked Compression Plate: Is This The Right Way To Go? doi:10.1016/j.injury.2011.06.266.
8. Wg Cdr V Kulshrestha, Primary Plating Of Displaced Mid-Shaft Clavicular Fractures. MJAFI2008; 64: 208-11.
9. Zenni EJ Jr, Krieg JK, Rosen MJ. Open reduction and internal fixation of clavicular fractures. J Bone Joint Surg Am. 1981; 63:147-51.
10. Nordqvist A, Petersson C. The incidence of fractures of the Clavicle. ClinOrthop 1994; 300: 127.
11. Neer C. Fractures of the clavicle. In: Rockwood CA Jr, Green DP editor(s). Fractures in Adults. 2nd Edition. Philadelphia: Lippincott Williams & Wilkins, 1984:707–13.
12. Jupiter JB, Leffert RD. Non-union of the clavicle. Associated complications and surgical management. J Bone Joint Surg Am. 1987; 69:753-60.
13. Andersen K, Jensen PO, Lauritzen J. Treatment of clavicular fractures: figure-of-eight bandage versus a simple sling. Acta Orthop Scand 1987;58:71- 4.
14. Hill JM, McGuire MH, Crosby LA. Closed treatment of displaced middlethird fractures of the clavicle gives poor results. Journal of Bone and Joint Surgery. British Volume. 1997;79(4):537–9.
15. Wick M, Muller EJ, Kollig E, et al. Midshaft fractures of the clavicle with a shortening of more than 2 cm predispose to nonunion. Arch Orthop Trauma Surg 2001; 121 (4):207-11
16. Nowak J, Mallmin H, Larsson S. The aetiology and epidemiology of clavicular fractures. A prospective study during a two-year period in Uppsala, Sweden. Injury 2000;31:353-8.
17. Iannotti MR, Crosby LA, Stafford P, Grayson G, Goulet R. Effects of plate location and selection on the stability of midshaft clavicle osteotomies: a biomechanical study. J Shoulder Elbow Surg. 2002; 11:457-62.
18. Daniel B. Judd, Mark P. Pallis, Eric Smith,and Craig R. Bottom. Acute Operative Stabilization Versus Nonoperative Management of Clavicle Fractures. Am J Orthop. 2009;38(7):341-45
19. McKee MD, Wild LM, Schemitsch EH. Midshaft malunion of the clavicle. J Bone Joint Surg Am. 2003; 85:790-7.
20. Shachar Shapira, Zeevi Dvir, Uri Givon,Ariel Oran,Amir Herman, and Moshe Pritsch. Effect of Malunited Mid shaft Clavicular Fractures on Shoulder Function, ISRN Orthopedics Volume 2011, Article ID 507287, 5 pages
21. Lazarides S, Zafiropoulos G. Conservative treatment of fractures at the middle third of the clavicle: the relevance of shortening and clinical outcome. J Shoulder Elbow Surg. 2006;15:191–194.
22. McKee MD, Pedersen EM, Jones C, Stephen DJ, Kreder HJ, Schemitsch EH, et al. Deficits following nonoperative treatment of displaced midshaft clavicular fractures. Journal of Bone and Joint Surgery. American Volume 2006;88(1): 35–40.
23. Canadian Orthopedic Trauma Society. Nonoperative treatment compared with plate fixation of displaced midshaft clavicular fractures. A multicenter randomized clinical trial. J Bone Joint Surg Am. Jan 2007; 89(1): 1-10.
24. Huang J , P, Chen MR, Wilber JH, Cooperman DR. Clavicular anatomy and the applicability of precontoured plates. J Bone Joint Surg Am. 2007; 89:2260
25. Altamimi Sahal A. Nonoperative Treatment Compared with Plate Fixation of Displaced Midshaft Clavicular Fractures: Surgical Technique. J Bone Joint Surg Am. 2008;
26. V Kulshrestha, et al. Primary Plating Of Displaced Mid-Shaft Clavicular Fractures. MJAFI 2008; 64: 208-11.
27. Wun-Jer Shen M.D. Tsung-Jen Liu M.D, Young-Shung Shen M.D. Po-Cheng Orthopaedic Institute, 100 Po-Ai 2nd Road, Kaohsiung, 813, Taiwan. Plate Fixation Of Fresh Displaced Midshaft Clavicle Fractures, Bone Joint Surg[Br]2008;90- B.1495-B
28. N. Modi, A.D. Patel, P. Hallam Norfolk And Norwich University Hospital NHS Foundation Trust,Norwich,UK. Outcome Of 62 Clavicle Fracture Fixations With Locked Compression Plate: Is This The Right Way To Go? doi:10.1016/j.injury.2011.06.266.
29. Virtanen KJ, Malmivaara AO, Remes VM, Paavola MP. Operative and nonoperative treatment of clavicle fractures in adults. A systematic review of 1 190 patients from the literature. Acta Orthop. 2012 Feb; 83(1):65-73.
30. Thyagarajan DS, Day M, Dent C, Williams R, Evans R. Treatment of mid shaft clavicle fractures: A comparative study. Int J Shoulder Surg 2009; 3(2):23-7.
31. Cesare Faldini, Matteo Nanni, Danilo Leonetti, Francesco Acri, Claudio Galante, Deianira Luciani , Sandro Giannini. Nonoperative treatment of closed displaced midshaft clavicle fractures, J Orthopaed Traumatol 2010 ;11:229-36
32. Hemant H. Mathur, Pulkit P. Maniar , Gaurang M. Patel , Hardik K. Tailor , Jinil N. Doshi .Study of results of clavicle fractures treated with clavicle plating in adults according to dash score. Int J Res Med. 2014; 3(2);37-40
33. Bostman O, Manninen M, Pihlajamaki H. Complications of plate fixation in fresh displaced midclavicular fractures. J Trauma.1997;43:778-783
34. Schiffer G, Faymonville C, Skouras E, Andermahr J, Jubel A : Midclavicular fracture: Not just a trivial injury - currenttreatment options.Dtsch Arztebl Int 2010; 107(41);711-7.
35. Chul-Hyun Cho, MD, Kwang-Soon Song, MD, Byung-Woo Min, MD, Ki-Cheor Bae, MD, Kyung-Jae Lee, MD. Reconstruction Plate versus Reconstruction Locking Compression Plate for Clavicle Fractures. Clinics in Orthopedic Surgery 2010: 2: 154-159.