

CONSERVATIVE VERSUS OPERATIVE TREATMENT OF DISPLACED MID SHAFT CLAVICLE FRACTURE- A TWO YEARS RANDOMIZED CONTROLLED STUDY

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ABSTRACT

BACKGROUND

Clavicle fractures were considered non-troubling entity in the past. Majority of mid shaft fractures used to be treated conservatively and many studies reported relatively good results. However, more recent studies have reported poor results following conservative treatment regarding non-union, disabilities and cosmetic reasons. Surgeons in the past use to fix clavicle fractures with pins, simple plates and external fixators having high failure rates. Whereas the results of operative treatment improved considerably with introduction of better implants and awareness regarding disability specially among young people and sports persons. The aim of this study was to compare results of closed versus operative treatment.

MATERIALS AND METHODS

Total of 80 patients with displaced mid shaft clavicle fractures in two groups of 40 each in conservative and operative groups were compared. Mean age was 30 years (18 years - 60 years). All patients in conservative group were treated using figure of eight bandage with arm sling, and in operative group curved locking plate was used. All patients were evaluated clinically and radiologically at three weeks, six weeks and after three months of treatment respectively. All patients were followed for 2 years following treatment. The outcome was rated using DASH score and Constant Moor scores.

RESULTS

Union resulted in all 40 patients in operative group whereas 2(5%) patients reported non-union in conservative group. The mean fracture union time was significantly lower in operative group (14.4 weeks) as compared to conservative group (24.2 weeks). The difference is statistically highly significant ($p < 0.000$). Dash score and Constant Moore score were significantly better in operative group. They were 94.2 and 96.4 in operative and 78.2 and 84.4 in conservative group respectively.

CONCLUSION

After 2 years of analysis it was found that operative treatment has better results in terms of improved functional outcome, early anatomical union and cosmetic appearance as compared to conservative treatment while treating displaced midshaft clavicle fractures in young active individuals, especially in sportsmen.

KEYWORDS

Fracture clavicle, Outcome, sportsperson, conservative v/s. operative management.

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BACKGROUND

The clavicle or collarbone is first bone to ossify in body, placed horizontally, protects brachial plexus and provides structural stability to shoulder girdle. Clavicle fractures are common injuries in active individuals specially associated with sports, which accounts for approximately 2.6% of the total body fractures and 34-45% of shoulder girdle injuries.^{1,2,3} Middle third fractures 69-81% are common

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among clavicle, which is thinnest and the weakest part with small amount of soft tissue coverage. 18 -20% of fractures in clavicle are in lateral third whereas 2-3% are in medial third.⁴⁻¹³ Conventionally, most acute- displaced mid shaft fractures were treated conservatively with the expectations of union, good function and patient satisfaction, as even with non-union not restrict function was acceptable to most of patients especially of old age group.¹⁴⁻¹⁷ However conservative treatment once popular is not favourable as for young active patients with displaced fractures. Whereas operative treatment has shown better results.¹⁶⁻²²

Aims and Objectives

The aims and objectives of present study was to review the treatment modalities used to be followed in the past while treating fracture clavicle and to compare them with present days treatment and evaluation of results of conservative treatment versus operative treatment.

MATERIALS AND METHODS

This two-year randomised controlled trial was conducted in the Orthopaedic Department of Acharya Shri Chandra College Of Medical Sciences, Sidhra Jammu from January 2012 to December 2013. In our study total of 80 patients in two groups of 40 each in conservative and operative groups were evaluated displaced mid shaft clavicle fractures. Patients having undisplaced fractures, proximal and distal shaft fractures were excluded from the study. In conservative treatment group- all patients were treated with figure of eight bandage which was applied and taught to patients and attendants in OPD. Movements were restricted for three to six weeks, followed by gradual mobilization. Check X-rays were taken immediately post bandaging and sling placement, at three weeks, six weeks, three months and six months. Among operative group, S shaped locking plate was used. All surgeries were performed under general anaesthesia. Surgical incision was curvilinear parallel to the shape of clavicle and locking plate was placed on superior surface of clavicle any butterfly fragment was fixed with a lag screw or SS wire bone suture. Cutaneous nerves encountered were preserved where possible. Post-operative patient was mobilized in arm sling with no restriction of movements, pendulum exercise is started very first day of surgery and gradually increasing to abduction. Cross-arm and overhead abduction is allowed after three weeks versus pain tolerance, whichever is earlier. Elbow movements were not restricted at all. Check X-rays were performed similarly at immediately post-operative, three weeks, and six weeks.



Figure 1



Figure 2

Figure 2. Screw Intramedullary clavicle nails of various sizes with close up view of the screw head portion of the nail.



Figure 3. Various Implants Used in the Past with High Failure Rates

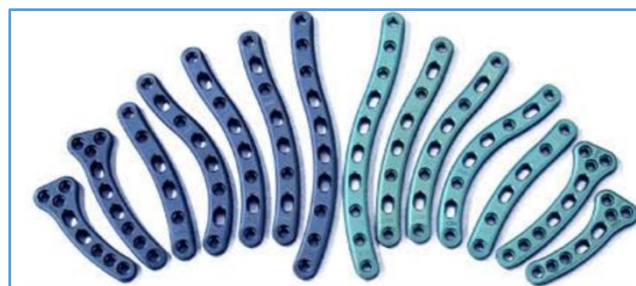


Figure 4. Modern Clavicle Fixation Locking Plates with High Success Rates

A total of 80 patients were selected for the study in which 40 patients were managed conservatively using figure of eight bandage with arm sling and 40 patients were managed by operative treatment using pre-contoured locking plate.

Inclusion Criteria

All displaced simple and comminuted mid shaft clavicle fractures were included in the present study.

Exclusion Criteria

Undisplaced fractures, re-fractures and previously non-unions were excluded from study.

RESULTS

Results of our study is summarised as, male to female ratio in both operative and conservative groups were 4:1 and 2:1 respectively. 60% patients in operative and 50% in conservative group were aged less than 30 years. Dominant limb involvement was of 4:1 in both operative and conservative groups. Road traffic accidents (70%) were main mode of injury followed by fall (by any means 30%) in both groups. Associated injuries in operative group were 35% as compared to 15% in Conservative group. Union was reported in all cases in operative group as compared to two cases of (5%) non- union in conservative group, both these patients were in higher age group and refused operative treatment. No case of implant loosening, plate breakage, infection, neuro-vascular injury and wound related complication was reported in operative group. The mean fracture healing time was much shorter in operative group (14.4 ± 0.60 weeks) as compared to longer time in conservative group (22.60 ± 0.70 weeks) respectively. DASH score was significantly better 96.6% in operative and 78.6% in conservative group, whereas Constant Moor score was

96.8% and 91.62 respectively. There was no statistically significant difference between two groups with respect to flexion, extension, abduction, internal rotation and external rotation movements with p value of 0.532, 1.00, 0.322, 0.052 and 0.056 respectively. Patients in operative group had better range of shoulder overhead abduction movement than conservative group ($p=0.015$). The mean follow-up of both groups was 12 months.



Figure 5. Pre-Operative, Intra-Operative and Final Radiograph of a 34 Years Old Patient

DISCUSSION

Traditionally, the treatment of fracture clavicle has been conservative as it was assumed that operative treatment carries lot of risk due to close proximity to brachial plexus, major blood vessels and dome of pleura. since clavicle is non-weight bearing bone and patient attains good function even after non-union.^{1,4,9,10,11} The concept of Dr. Neer and Rowe 1960, was that open reduction and internal fixation of fracture clavicle should be avoided because of high union rate with conservative treatment and operative treatment carries risks of non-union, implant failure, infections and various other complication because of its vital position.

Recently the literature reported a high rate of good outcome with low rate of complications as compared to conservative treatment. There were no functional benefits from operative treatment in terms of functional outcome.²²⁻²³ Nevertheless many authors have suggested operative treatment for fracture clavicle particularly in cases of high displacement, skin penetration, comminution which otherwise carries high complication rate,^{16,18,20} despite the fact that the risk of rare complications described in literature. Many possible complications are associated with operative treatment including subclavian vessel injury, brachial plexus injury²⁴⁻²⁸ requiring immediate repair.^{24,26}



Figure 6. A 56 Years Male, Accepted Malunion and Cosmetic Deformity

The functional consequences of clavicle shortening are controversial.¹⁷⁻³⁰ Hill et al.¹⁷ and McKee et al.²⁸ have reported shoulder dysfunction with shortening of 20 mm or more. However, Nordqvist et al.²⁹⁻³¹ have reported no clinical significance of shortening on function of shoulder and patient accepts angulations as well as residual bone prominence.

The clavicle has several important functions facilitating shoulder placement more laterally and improving hand functions. Cadaveric assessments revealed abnormal biomechanical stress across shoulder girdle, including the acromio-clavicular, glenohumeral and scapula-thoracic joints.^{5,6,7} These studies provide a mechanical rationale for the idea that anatomical reduction may mitigate long-term disability. Study of mid-shaft shortening correction demonstrated high rate of patient satisfaction after operative treatment³ Displaced fractures with shortening more than 15 mm should be treated operatively for better results. A meta-analysis of recent studies shown reduced risk of non-unions by 86% in operative as compared to conservative group.²

Primary fixation of clavicle is easy procedure and of more benefit to patient as well surgeon in terms of fast recovery and fast rehabilitation than established mal-union and non-unions.⁸ Stable fixation is safe and effective treatment with minimal complications than treating non-unions.²

According to the Jadad model, the Cochrane review by Lenza et al¹² was selected in systemic review and found that surgical intervention was superior to conservative treatment in DASH questionnaire, Constant Moor scoring, symptomatic malunions, overall treatment failure, deformity or asymmetry, stiffness/restricted range of shoulder movements, number of patients return to sports activities and time to return back to previous activities.

Conclusion is consistent with the finding by Robinson et al⁵ that primary fixation for displaced mid clavicle fracture and found that open reduction and plate fixation has lower rate of non-union and better functional outcome.

CONCLUSION

Operative treatment of fracture clavicle has improved outcome in terms of short union time, anatomical restoration of shape and length, early mobilization and fast rehabilitation as compared to conservative treatment, in our two-year follow up. Primary fixation of fracture clavicle with S shaped clavicle locking plate attaining anatomical union is of immense importance while treating young, active and a sports man.

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