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Study of results of clavicle fractures treated with clavicle plating in adults according to dash score

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Abstract

Background: Clavicle fractures are common injuries in young, active individuals which were treated conservatively with a sling or figure of 8 brace. In the present study, we have treated displaced clavicle fractures with open reduction and internal fixation using anatomical locking clavicle plate.

Materials and Methods: All the patients were evaluated clinically according to DASH SCORING and radiologically at 5 months post operatively

Results: In majoring of the patient, fractures were united within 7 to 8 weeks. Mean union time is 7.3 weeks. Majority had FINAL DASH SCORE around 32. All 20 patients had full range of motion at final follow up without any limitation

Discussion: Result of *previous* studies compared with present study

Conclusion: Precontoured Anatomical Locking Clavicle Plate is preferred for the treatment of displaced or non united clavicle fractures with better functional outcome and faster recovery compared to other modes of treatment.

Keywords: Displaced clavicle & fracture, anatomical locking clavicle plate

Introduction

Clavicle fractures are common injuries in young, active individuals especially those who participate in activities or sports where high speed falls or violent collisions are frequent and they account for approximately 2.6% of all fractures^[1]. Epidemiologically, the incidence in males was highest in age group under 20 years decreasing with increasing age^[2]. Middle third fractures account for 80-85% of all clavicle fractures where the typical compressive forces are applied to the shoulder and the narrow cross section of the bone combine and result in bony failure. Distal third fractures account for 20% and they tend to occur in more elderly individuals as a result of simple fall. Medial third fractures are rarest accounting 5%". Operative treatment consists of open reduction and internal fixation with plates and screws or intramedullary nail. Plating techniques continue to evolve. Newer precontoured anatomical locking plates allow more accurate fitting while maintaining strength; compared to earlier locking compression plates and reconstruction plates¹. Currently, most commonly used technique is superior placement of plate but when the fracture configuration allows we prefer anteroinferior plate placement because of the safe screw trajectory and less hardware irritation.

Materials and Methods

This prospective study was carried out at Orthopaedic clinics of Shree Sayajirao Gaekwad Hospital. The study was approved by Ethical committee of our University and informed consent was taken from patients. All patients were informed and explained about the injury and their treatment plan. Study design: Prospective Observational Study. Sample size: Based on feasibility criteria

Study population: Patients admitted in wards in the Department of Orthopaedics, Medical College and S.S.G. Hospital, Vadodara. Investigations: X ray Period of Data Collection: August'2016 to July'2017

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Outcome parameters: Periodic assessment clinically according to Dash (Disability of Arm, Shoulder and Hand)⁷ functional scoring system and radiologically according to X rays at 1month, 3months and 5months follow up.

Inclusion Criteria: Displaced close fractures of clavicle

Exclusion Criteria: Open fractures, fractures in children (age < 18years), fractures in pregnant females, medically unfit patients, pathological fractures, unwilling patient

Method of treatment: All the patients were treated with open reduction and internal fixation with clavicle plate with Anatomical precontoured locking compression plate with screws. The operative plan was decided according to fracture pattern.

Pre-Operative Assessment: Routine blood investigations, Radiological assessment First we had classified fractures according to Allman's classification as per profoma and then on x-ray we determined the size of the plate. If the fracture is too comminuted or with shortening then we calculated the plate size on X ray of the opposite extremity. After the patient was fit for surgery medically and anaesthetically, we posted the patient for surgery.

Type of Anaesthesia: Local Block / General Anaesthesia After anaesthesia, the patient was shifted on the plain O.T. table in 'Beach chair' semi-sitting position with a pillow in the inter-scapular region which will allow the shoulder to drop back which helps to restore length and increase exposure of the clavicle. Local parts (including same side upper limb) were prepared, painted and draped.

Approach and Incision: An incision centered over the fracture medially from the sterna notch laterally up to the anterior edge of acromion was kept. The lateral platysma was released and the supraclavicular nerve traversing the anterior aspect of clavicle was identified. The clavicular fascia was incised along its attachment to anterior clavicle and elevated inferiorly. Careful dissection was done avoid injury to the vital infra clavicular structures, first along the medial fragment and then the lateral fragment. The fracture was reduced and fragments held with bone clamps, K-wire or a lag screw if the fracture is oblique. A precontoured plate of sufficient size is placed either over superior or anterior surface and fixed with screws in supero-inferior direction for superior plate and antero-posterior direction for anterior plate taking care to avoid injury to the vital neurovascular structures.

Post-Operative Management: The operated limb was supported in a collar-cuff sling or a shoulder immobilizer. The pendulum exercises were taught and patients were encouraged to use the arm avoiding heavy weight lifting, pushing or pulling. Patients were discharged on the 3rd or 6th post-operative day according to the dressing status. The suture removal was done on the 10th to 12th post-operative day and called for 6weekly follow-up. At that time of follow-up patients were assessed clinically and radiologically. Once early callus formation was present on x-ray patients were advised progressive weight lifting, till patients were mobilized full weight lifting. All the patients were evaluated according to Dash Scoring at 6 months post operatively.

Result

- In our series, age varied from 19 to 55 years, with a mean age of 27 years.
- There was male predominance. Male: Female ratio was 9:1
- Commonest mode of injury was vehicular accident (55%) and fall from height (45%).
- Majority of our patients were labourers by occupation.
- Majority of patients were operated within 7 days from injury.
- Left side was affected in majority of patients (65%).
- Majority of our patients were having Middle third fracture (85%).
- Intra-Operatively, no complications were encountered in any patients.
- In postoperative period, we had no complication except one case of mild shoulder and one patients with implant expose.

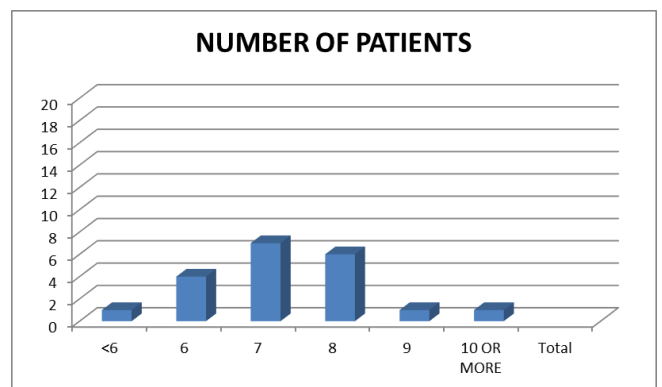


Fig 1: Fracture Union In majority of the patients, fractures were united within 7 to 8 weeks. Mean union time is 7.3 weeks.

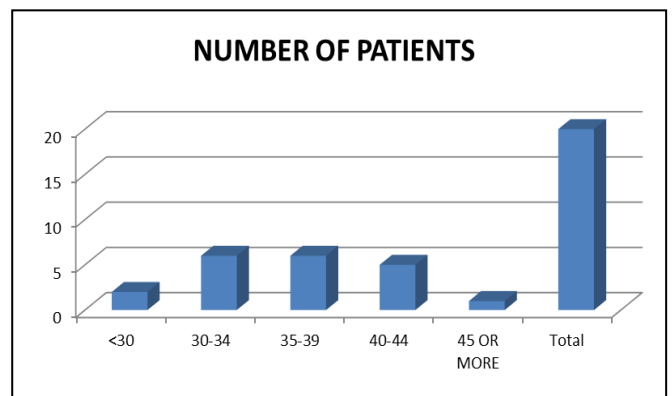


Fig 2: Final Dash Score Majority had FINAL DASH SCORE around 32. All 20 patients had full range of motion at final follow up without any limitation.

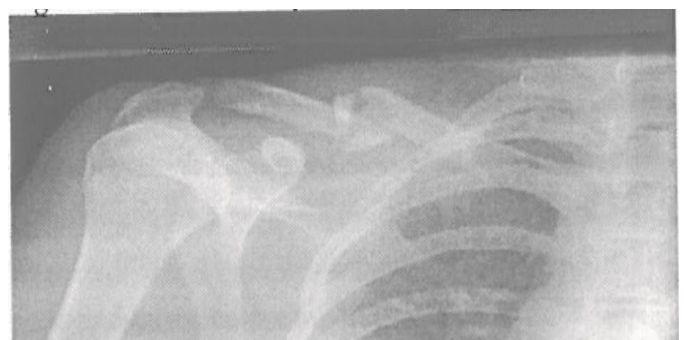


Fig 3: Pre of X-ray

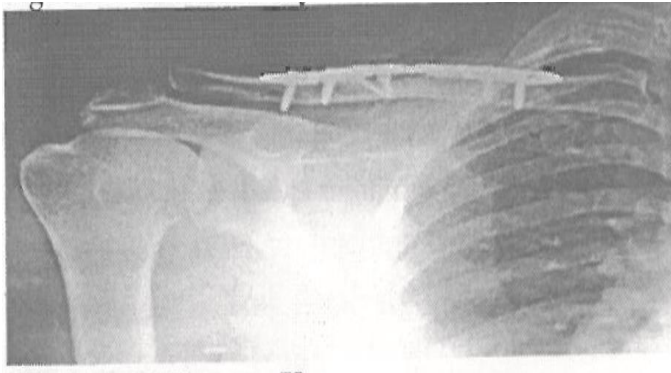


Fig 4: Post of X-ray

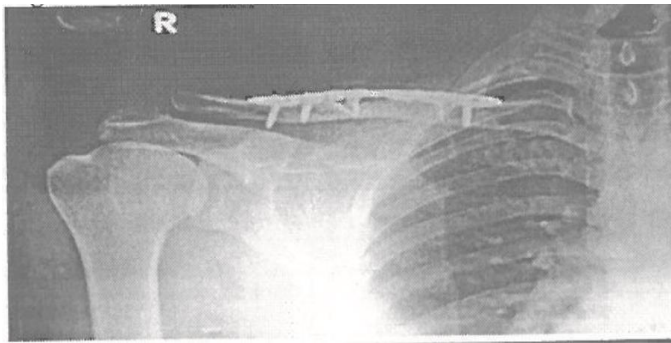


Fig 5: Follow Up X-ray

Discussion

Since long, the treatment of clavicle fractures has been nonoperative. Until recently, the literature reported a high rate of good outcomes with a low rate of nonunions following nonoperative treatment, and there was no evidence of functional benefits resulting from surgery in comparison with nonoperative treatment. Nevertheless, many authors have recently suggested operative treatment for clavicle fractures, particularly in the case of high displacement or comminution, and have reported lower rates of nonunion and better functional outcomes for operative treatment. Among the conservative treatment, sling or figure of 8 bandage is used widely¹. Main problems with conservative treatment are nonunion, poor functional outcome, prolonged recovery time. Zlowodki's study of displaced, midshaft fractures of clavicle revealed nonunion rates between 15 - 20%^[2]. Hill noted unsatisfactory patient orientated functional outcomes in 16 out of 52 adult patients (31%) for the conservative treatment of displaced mid-shaft clavicle fractures^[10]. McKee; studied the deficits following nonoperative treatment of displaced midshaft clavicular fractures in 30 patients detected symptomatic clavicular malunion following non operative treatment^[9], residual deficits in shoulder strength and endurance in this patient population, which may be related to the significant level of dysfunction detected by the patient-based outcome measures.

Table 1: Parameters

Parameter	Study of 20 Cases	Operative Fixation of Displaced clavicle fracture with superior reconstruction plate osteosynthesis (Kathmandu University Medical Journal) Study of 20 cases
Mean age	27YR	31YR
Sex		
Male	90%	80%
Female	10%	20%
Side		
Right	35%	50%
Left	65%	50%
Type		
Middle Third	85%	100%
Lateral Third	15%	
Intra op Complication	NIL	Nil
Post op Complication	NIL Except one patients had mild pain,one implant expose	1 Deep Infection 1 Frozen Shoulder
Mean Union Time (WKS)	7	
Mean Final Dash Score	32	41
Final Range of motion	Full	Full
Final Result		
Excellent	10%	2%
Good	85%	94%
Poor	5%	4%

The goal of surgery is to improve the functional outcome, avoid non unions and symptomatic malunion by achieving close to anatomic reduction. In present study, in majority of the patients, fractures were united within 7 to 8 weeks. Mean union time is 7.3 weeks. Majority had Final Dash Score around 32. All 20 patients had full range of motion at final follow up without any limitation. Out of all 20 patients, majority 17(85%) had a Good result and 2(10%) had excellent result, 1(5%) had poor result. The results of the present study are compared to that of a previous study. Canadian Orthopaedic Trauma Society conducted multicenter,

prospective clinical trial, on 132 patients with a displaced midshaft fracture of the clavicle concluded that Dash scores was significantly improved in the operative fixation group. Operative fixation of a displaced fracture of the clavicular shaft results in improved functional outcome and a lower rate of malunion and nonunion compared with nonoperative treatment at one year of follow-up. Hardware removal remains the most common reason for repeat intervention in the operative group. This study supports primary plate fixation of completely displaced midshaft clavicular fractures in active adult patients^[6]. Robinson CM, in a prospective,

multicenter, stratified, randomized controlled trial, 200 patients between sixteen and sixty years of age who had an acute displaced midshaft clavicular fracture were randomized to receive either primary open reduction and plate fixation or nonoperative treatment [8]. The rate of nonunion was significantly reduced after open reduction and plate fixation as compared with nonoperative treatment. Overall, Dash score was significantly better after open reduction and plate fixation than after nonoperative treatment at the time of the one-year follow-up concluded that Open reduction and plate fixation reduces the rate of nonunion after acute displaced midshaft clavicular fracture compared with nonoperative treatment and is associated with better functional outcomes [3, 4]. Regarding acute, displaced fractures, an ongoing debate in the literature shows that there is no consensus concerning the optimal choice of treatment.

Conclusion

Open reduction and internal fixation using precontoured anatomical locking compression plate facilitated:

- Anatomical reduction
- Better implant for all types of clavicle fractures as implant is anatomically contoured
- Less operative time
- Less implant failure rate
- Less implant removal rate
- Accurate screw placement that prevents neurovascular injury
- Faster union
- Better functional outcome
- Faster return to day to day activity with minimal complications

Thus, it is concluded that Precontoured Anatomical Locking Clavicle Plate is preferred for the treatment of displaced or non united clavicle fractures with better functional outcome and faster recovery compared to other modes of treatment.

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