

Management of Acute Dislocation of Acromioclavicular Joint with Clavicle Hook Plate, a Functional Outcome Study

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Abstract

Objective: To evaluate the functional outcome of shoulder in patients with acute acromioclavicular joint (ACJ) dislocation treated by using hook plate.

Study type, settings & duration: This prospective observational study was conducted in the department of Orthopaedics, Liaquat National Hospital and Medical College, Karachi from December 2017 to May 2019.

Methodology: Total 23 patients with acute acromioclavicular joint dislocation were enrolled in the study. All patients were operated with open reduction and internal fixation using clavicular hook plate, after three months of surgery the plate was routinely removed from all patients. The functional outcome of patients was assessed on day before removal of plate, at three months after removal of plate and 12 months after the surgery using Constant Murley Score (CMS).

Results: Among all, 78% were male and 22% were female. Mean age of patients was 37.40. The average Constant-Murley Score at the day before removal of plate was 47.17 as compared to 74.56 three months after removal of plate and 92.17 at last follow up, one year after initial surgery was statistically significant (p value <0.05). No complication like re-dislocation, wound infection, skin irritation, implant prominence and implant cutout was noted in any patient.

Conclusion: In the treatment of acute dislocation of acromioclavicular joint, reduction and fixation with hook plate is best option. Using this plate excellent results can be obtained on the basis of radiographs and function.

Key words: Acromioclavicular joint, acute dislocation, functional outcome, hook plate.

Introduction

The acromioclavicular joint is commonly injured joint and injury to it compromise activity of upper limb. There are many controversies in the management of these injuries and many few treatments continue to evolve up to this day. Fall on the out stretched hand causes most of these injuries whereas repetitive use of the shoulder, such as heavy labor and athletics also predispose it to

injuries. Acromioclavicular joint is involved in around 9-12% of total injuries of shoulder.¹⁻⁴

Rockwood⁵ is commonly used classification system and classifies injuries to acromioclavicular joint in to six different types, type I and II injuries are managed without surgery, whereas remaining types are managed with various surgical procedures. Treatment of type III injuries are controversial.⁶⁻⁹

Options for treatment of these injuries are bandages and slings to multiple, open reduction and internal fixation with various implants like pins, tension band wiring, washer and screw, suspensory fixation devices or clavicular hook plates. All implants and procedures have their pros and cons but no one is considered superior to other.¹⁰

The clavicle hook plate is anatomical plate and is of various sizes. After reducing the joint, this plate has been used to fix the dislocation at its anatomical place. This plate is very convenient to use but can cause complication like sub acromial impingement and acromial osteolysis if left in place for prolong time hence removal of the plate is recommended once stability of joint is achieved and is usually after three months. Clavicular hook plate

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Authors Contribution

SS & KRN conceptualized the project. SS & SSN did the data collection and literature search. SS, KRN & SSN also performed the statistical analysis. Drafting, revision & writing of manuscript were done by SS, KRN, SSN & AT.

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is considered as good device for surgical fixation of acromioclavicular joint dislocation.¹¹⁻¹³

This study was carried out to assess the results of clavicle hook plate on functional outcome of shoulder in the patients with acromioclavicular joint dislocation.

Methodology

This prospective observational research was carried out in Liaquat National and Medical College, Karachi, a tertiary care hospital from December 2017 to May 2019 for the surgical treatment of acute acromioclavicular joint dislocation. Participants of this study were patients who sustained Rockwood type III, VI, V, VI dislocation with history of trauma, either gender, age from 18 to 60 years, unilateral closed dislocation and patients with history of trauma not more than two weeks. Patients with type I, II injuries, wound, multiple traumas, and injury to nerve, vessels and ipsilateral humerus and clavicle fractures were excluded. Patients who full filled inclusion criteria were initially assessed and managed at emergency department where all patients were evaluated on the basis acute trauma and life support (ATLS) protocol. After primary and secondary survey local examination of the affected shoulder was done. On local examination condition of skin, wound, any bruise associated injuries, distal neurovascular status and possible movements at shoulder joint were assessed and documented. Intravenous analgesics given for pain control, muscle relaxant given to relax the injured muscles and affected limb was supported in the polysling, tetanus prophylaxis was also given. Dislocation of acromioclavicular joint was diagnosed on radiographs of shoulder in anteroposterior, axillary lateral and zanca views done in emergency department. After initial management and diagnosis patients were informed about nature of injury and its management with hook plate and were admitted in ward and were scheduled for surgery on next day. For surgery patients under general anesthesia were put on table in beech chair position, the limb to be operated was prepared and draped in usual manner. The acromioclavicular joint was approached through transverse incision on later part of clavicle; the joint was reduced and was held in reduced position temporarily by using k-wires and final fixation was done by using 3.5 mm clavicle hook plate. Injured ligaments around the joint were left as such. These principles are followed when open reduction and internal fixation is done when implants like screws and k-wires etc. rather than hook plates are used.

We followed two principles

1. AC joint opened and debrided
2. Stable reduction and fixation done using hook plate

There remains no need to repair or reconstruct the ligaments when hook plate is used for fixation as guided by manual of hook plate. After procedure arm was put in polysling, intravenous antibiotics were given for 24 hours and analgesic were also given for pain. On first postoperative day radiographs of operated shoulder were done in anteroposterior and lateral views to confirm the position of joint and plate. Surgical wound was assessed, dressing of wound was changed, and patients with the limb in polysling were discharged from hospital on second postoperative day and were called for follow up after two weeks for removal of stitches and for post - operative rehabilitation. Patients were followed subsequently at six weeks to see the compliance of the patient with postoperative rehabilitation protocols and then at 12 weeks after surgery. Irritation of acromion and impingement of rotator cuff are potential complication of hook plate if left inside body for prolong period so removal of hook plate is recommended.¹⁴ All patients underwent routine implant removal after 12 weeks of surgery and subsequently physiotherapy was continued after plate removal. The participants were assessed at two weeks, three months after removal of plate and one year after initial surgery. The radiographs of operated shoulders were taken at every follow up visit to make sure that the joint between acromion and clavicle is reduced and has maintained required anatomical position and to assess the distance between coracoid process of scapula and clavicle.



Pre and postoperative radiographs of patient showing Acromioclavicular joint dislocation and fixation with clavicle hook plate.

Results of procedure were evaluated by restoration of function of shoulder which was

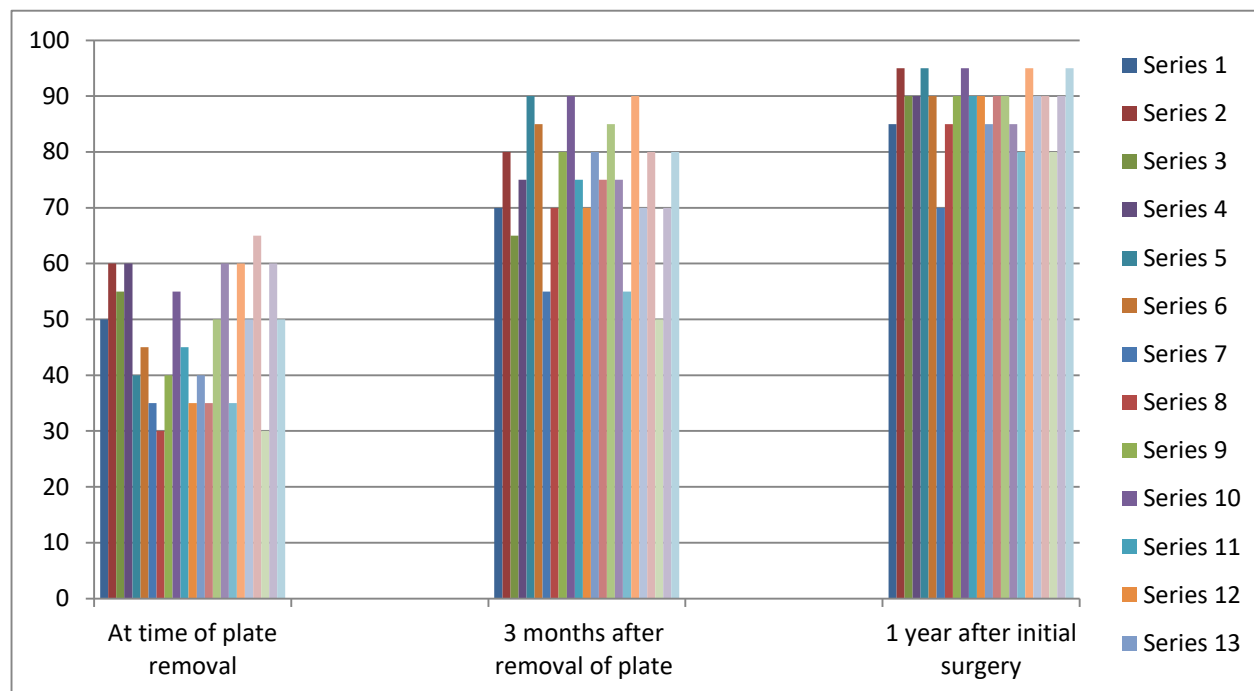


Figure: the Constant-Murley Score at three different follow up visits.

measured on basis of Constant Murley shoulder functional score.¹⁵ Constant-Murley Score (CMS) measures the severity of pain, level of activity, range of movements on shoulder and power of muscles. Maximum score is 100. CMS of all study patients was recorded just before removal of plate and 3 months after removal of plate. Final score was measured at last follow up visit i.e. 1 year after initial surgery. The scores obtained at three different follow up visit were compared to one another.

The ethical approval was obtained from Institutional Review Board of Liaquat National Hospital and Medical College, Karachi.

Results

Twenty three (23) patients with dislocation of the joint between acromion process of scapula and clavicle were treated at Liaquat National Hospital, Karachi (level 1 trauma center) from December 2017 to May 2019. Out of 23 patients, eight patients had type III, nine patients had type VI, four patients had type V and two patients had type VI acromioclavicular joint dislocation.

The study participants included 18 (68%) males and 05 (22%) female. Average age of participants was 37.40 years (range 18–60 years). Most patients (60%) suffered from fall on shoulder or fall on outstretched hand. Athletic and road traffic injuries were second (28%) most common

mechanism of injury. History of trauma in all participants was less than four days. In most of the patients (60%) dominant side was involved. Interval between dislocation and procedure was days. All patients were operated by senior orthopaedic consultant surgeon who had experience of more than 20 years in orthopaedic. Time duration of surgical procedure was ranging from 35 to 55 minutes with average of 43 minutes.

The average Constant-Murley Score on the day just before removal of plate was 47.17 as compared to 74.56 three months after removal of plate and 92.17 at last follow up (1 year after initial surgery) was statistically significant (p value <0.05) (Figure).

None of patients developed wound infection, x-rays shoulder anteroposterior and lateral views confirmed that the joint was anatomically reduced and no incongruence was seen in any patient. Few patients had complains of discomfort, limited movement above head and internal rotation which were relieved after plate was removed.

Assessment of patients at final visit revealed that all patients achieved pain free full range of motion at shoulder joint. After plate removal joint was stable in all patients which was confirmed by radiographs and was documented.

Discussion

The patients in our study with acromioclavicular joint dislocations treated with clavicle hook plate showed good to excellent results by final evaluation. The results were satisfactory even before and after the removal of implant.

Traumatic dislocation of joint between acromion process of scapula and clavicle is common phenomenon. There are six different types of dislocations as classified by Rockwood and different option of treatment are available for these.^{16,17} Type I or II dislocations are managed without surgery in polysling or in bandages, whereas rests of types are treated with operative fixations by most of surgeons.¹⁸ Implants for operative fixation include Kirschner wires, screws, endobuttons and these have been used with different approaches and techniques and have shown different results, but one of them is superior to other and all implants have their merits and demerits. The implants mentioned above are used just to hold the reduced joint in the place and do not provide rigid stable fixation hence many cases of loosening of implants and redislocation of the joint have been reported in the literature.¹⁴

Clavicle hook plate is anatomically precontoured plate; it is provide a solution for fixation of acromioclavicular joint as well as fixation of fracture of lateral one third of clavicle. This plate and screw construct allow early rotational mobility of shoulder. It is a 3.5 mm locking plate which works by providing compression at fracture and dislocation site and its locking screw provides rigid and stable fixation, hence the possibility of loosening of plate and redislocation of joint is less likely. Clavicle hook plate is made up of titanium or 316L stain less steel and are of four different sizes depending upon number of holes in plate from 4 holes to 7 holes.¹⁹

Since the development of clavicle hook plate, it is considered as standard implant for surgical fixation of dislocated acromioclavicular joint and is favored treatment option by most surgeons and is frequently used.¹⁷

Narinder Kumar and Vyom Sharma published a study in which 33 patients diagnosed with acromioclavicular joint dislocation were treated using clavicular hook plate. They assessed out come on basis of constant shoulder score and found average score of 91.3 on the last follow up visit.¹⁴

Haytham A Mohamed and Fady M Fahmy published a prospective study in 2018 involving 20 patients with acromioclavicular joint dislocation treated with hook plate. They removed plate from all patients after 3 months of fixation and measured outcome results on basis of Constant Murleyscore

(CMS). The mean CMS recorded on final follow up visit was 92.9.¹⁹

Hemman et al. also presented study of 99 patients in 2020. They treated patients with acromioclavicular joint dislocation by using hook plate and measured their post - operative outcome on the basis of DASH score and constant Murley Score (CMS). They found excellent results and their mean score at final follow up visit was 5.6+/- 1 points on DASH basis and 90 +/- 1.4 points on the basis of CMS.²⁰

The results of our prospective observational study done on patients diagnosed with dislocation of acromioclavicular joint and treated using hook plate are comparable with the results of studies mentioned above.

In the treatment of acute dislocation of acromioclavicular joint, reduction and fixation with hook plate is best option, by using this plate excellent results can be obtained on the basis of radiographs and function.

Conflict of interest: None declared.

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