

Functional outcome of surgery in acute acromioclavicular joint dislocation using a Hook Plate: A retrospective observational study.

Shrawan Kumar Thapa¹, Manoj Kandel¹, Sunil Panta¹, Bishwa Raj Adhikari¹
¹(Department of Orthopedics, Bharatpur Hospital, Nepal)

Abstract:

Introduction: Acromioclavicular joint (ACJ) dislocation of Rockwood type-IV to VI is painful and can be treated by surgery using hook plate. The aim of this study was to find the outcome of the surgery done to treat ACJ dislocation using hook plate in Nepalese people. **Methods:** Retrospective review study of the 37 patients who underwent surgery with the hook plate for fixing ACJ dislocation. Implants were removed after 12-16 weeks, and treatment outcome was measured by UCLA score which had scale ranging from 0-35. Higher the score, better the outcome. **Result:** Road traffic accident was the cause of ACJ in 56.8% of the patients and the median UCLA score after the implant removal was 30 (27-33). Excellent outcome was seen in 48.65% and poor outcome was seen in only 2 (5.41%) patients. No complication was observed in 58.33% cases while osteolysis was reported in 27.78% and pain was reported by 2 patients. **Conclusion:** Treatment of ACJ dislocation by surgery using hook plate is effective in Nepalese people.

Keywords: Rockwood; Acromioclavicular joint; Hook Plate; UCLA Score

Date of Submission: 01-01-2022

Date of Acceptance: 12-01-2022

I. Introduction:

Direct shoulder impact leads to Acromioclavicular joint (ACJ) dislocation and represents up almost 9% of all the shoulder injuries.¹ It is common among athlete and young person due to blunt force to the shoulder.² Reports suggest that almost 50% of the shoulder injuries associated with sports affect ACJ.³ It is worth discussing about ACJ dislocation because dislocation of ACJ not only produces pain but also affect daily activities due to the joint instability and limited movement and active workforce moves out. Dislocation of ACJ is classified as per the Rockwood classification system which is based upon the degree and direction of dislocation and includes six types.⁴ While type-I and type-II Rockwood classification of ACJ are treated conservatively, type-IV to type-VI are treated surgically. Whereas the surgical treatment of type-III is still under controversy.⁵

Surgical methods in practice for the treatment of ACJ dislocation are myriad. However, there is no such gold standard method of treatment. There are two surgical methods which are commonly practiced. The first method is called rigid fixation methods because it uses "hook plate and screws" which needs to be removed. It has some complications like breakage, and loss of reduction.⁶⁻⁸ The second method makes use of suture buttons, suture anchors, tendon grafts, and synthetic slings for the reconstruction of ligament. Complications associated with this method is ligament failure, loss of reduction etc.^{9,10}

Since none of the methods have been proven better than other, we use the hook plate for the surgical treatment of ACJ dislocation in our hospital. The reason we use hook plate is that it matches and allows for micro-adjustment according to the anatomy of clavicle. Although the hook plate is mostly used for the treatment, there is no study done previously to assess its functional outcome in Nepalese context. Therefore, we aim to report the outcome of the surgery done in Nepalese people for fixing ACJ dislocation by using hook plate.

II. Materials and Methods:

This was a retrospective review study conducted over the patients who underwent treatment for the ACJ dislocation in Bharatpur Hospital, Nepal between June 2020 and May 2021. Protocol of the hospital is to preserve the data of the outcome in the given format while patients are in follow-up. Therefore, we collected data from the record section after receiving the ethical approval from the Institutional Review Committee for the study (Approval number: 078/79-002). For this study, we included patients of age 18 years to 60 years having ACJ dislocation of Rockwood type IV to VI and treated with the hook plate within a fortnight of injury. Patients

with Rockwood type-I to type-III or the patients with late presentation were excluded. In line, we included all the 37 patients meeting inclusion criteria.

Surgical Technique: Surgery was performed under general anaesthesia with the position of patients being like in beach chair. An incision of 5-6 cm was made transversely over the acromioclavicular joint (ACJ). After that hook of the acromioclavicular plate was introduced under the acromion through posterior position of ACJ and then fixed with four to five locking screws of 3.5mm over the plate under fluoroscopy. Finally, wound was closed in layers after proper haemostasis. Post-operatively, patient was put on the arm-pouch sling for a week and sutures were removed after two weeks. All the movements of shoulder were allowed after a week except abduction beyond 90-degrees. Patient was kept on follow-up for functional observation and implants were removed after three to four months.



Figure1: ACJ dislocation.



Figure2: Hook Plate implant



Figure 3: Scar of surgery



Figure 4: osteolysis

Post operative functional assessment:we used UCLA assessment tool for determining treatment success. This is because a previous study reported that UCLA is a better tool than CSS and OSS for determining treatment success of shoulder injury being it a holistic assessment.¹¹ The UCLA scores were measured through a self-reported UCLA shoulder rating scale during follow-up period after removal of implant. UCLA is a tool having summated rating scale with five questions. For the subjective assessment of shoulder condition, UCLA has three self-reporting questions related to pain, satisfaction, and function after the treatment with their maximum scores of 10 points, 5 points, and 10 points respectively. For the objective assessment, two questions related to active forward flexion (maximum 5 points), and strength (maximum 5 points) were included in the tool. The range of total score in UCLA tool varies between 0 to 35 where higher score reflects better outcome.¹²
¹³ We used STATA 15.1 for all the statistical calculations. Based upon the UCLA score we further categorised treatment success into four categories named poor (UCLA: 0-20), fair (UCLA: 21-27), good (28-33), and excellent (33-35).^{14,15}

III. Results:

Results showed that median age of people who had shoulder dislocations was 34 years while majority of them were male (56%). Although four modes of injury were noticed, 56.8% of the injury was due to road traffic accident (RTA). Most of the patients, approximately 68%, presented for the treatment had ACJ dislocation of Rockwood type-IV. Surgeries were done for the treatment on sixth day on an average while mean time for the implant removal was fourteenth weeks of surgery. Median score calculated on UCLA scale for treatment outcome was 30 (Table 1).

Table1: Baseline Patients' demography (n=37)

Parameters	Characteristics	
Age (years) ^a		34 (24 - 42)
Sex ^b	Male	21 (56)
	Female	16 (43)
Mode of injury ^b	RTA	21 (56.8)
	Fall from height	7 (18.92)
	Sports	6 (16.2)
	physical assault	3 (8.11)
Side of injury ^b	Right	20 (54.05)
	Left	17 (45.95)
Diagnosis ^b	Rockwood III	1 (2.7)
	Rockwood IV	25 (67.57)
	Rockwood V	11 (29.73)
Duration since time of injury (Days) ^c		5.3 (2.5)
Implant removal (weeks) ^c		13.5 (1.12)
UCLA Score ^a		30 (27-33)

The distributions of the variables are summarised using; ^aMedian and inter-quartile range; ^bfrequencies and percentages; ^cmean and standard deviation.

In order to make the interpretation easy to understand regarding treatment outcome, we categorized UCLA into four group as per recommendation and found that almost 49% of surgery had excellent outcome and only 2 patients (5.41%) had poor outcome of the treatment (Table 2).

Table2: Results of Surgery (n=37)

UCLA Score outcome	n (%)
Poor	2 (5.41)
Fair	8(21.62)
Good	9 (24.32)
Excellent	18 (48.65)

Table3: Complications.

Complications	n (%)
None	21(58.33)
Osteolysis of acromion and clavicle	10 (27.78)
Superficial wound infection	3(8.33)
Pain during abduction	2 (5.56)
missing	1

We also observed complications and found that 10 out of 36 patients had osteolysis of acromion and lateral clavicle and 8.33 percent had superficial wound infection which was cured by a course of antibiotic (Table3).

IV. Discussion:

ACJ dislocation is commonly seen among athlete and young people who comes out of the active workforce for few months due to pain and impaired function of the shoulder. Therefore, proper treatment and satisfactory outcome is needed. Previous studies had reported that hook plate was used successfully and provided satisfactory outcome for the treatment of ACJ dislocation.^{16, 17} In line with the previous report, we also used hook plate for the treatment of ACJ dislocation in Bharatpur hospital, Nepal but there was no study done to report the outcome of the surgeries in the population. Therefore, we decided to report functional outcome of the surgery among Nepali people on UCLA score through this paper because it will help in deciding the surgery techniques to be used for orthopaedic surgeons.

We successfully met our objective and found satisfactory result of the surgery like previous studies. We achieved excellent (UCLA score:34-35) outcome in 48.65% of the patients while a study conducted by

Hong-Lve tan reported to have excellent outcome in only 22% patients.¹⁸ Average age may be the probable reason for greater number of excellent outcomes in our sample compared to the previous one. Median age of our study sample was 34 years while the mean age in his study was about 42 years. Another difference was that we had poor outcome in 5.41% but his study did not report any poor outcome because he had fair result for those with UCLA less than 29 points while we have fair result from UCLA score 21 to 27 and poor result from score zero to 20 as recommended.^{14, 15}

Like other surgical procedure, this does have some complications and we also witnessed some complications like pain during abduction, superficial wound infection, and osteolysis. We saw superficial wound infection in 8.33% of patient which is very similar to the report made over the surgeries of 10 patients.¹⁷ Superficial wound infection was controlled by oral antibiotics in our participants. Like our findings, Chang-Hong Chen with his friends also found the hook plate to be effective for the treatment but some complications too such as osteolysis.¹⁹ We also found osteolysis of acromion and lateral clavicle in almost 28% of the cases.

V. Conclusion:

Treatment of ACJ dislocation of Rockwood type-IV to VI can effectively be treated by using hook plate with excellent outcome. However, need for second surgery for removing still remains. Nevertheless, in the low resource setting, the method is acceptable. This study was done on small sample size so cannot be scaled up to other setting and thus feels the requirement of further study with appreciable sample size.

References:

- [1]. Shaw MB, McInerney JJ, Dias JJ, Evans PA. Acromioclavicular joint sprains: the post-injury recovery interval. *Injury*. 2003;34(6):438-42.[https://doi.org/10.1016/S0020-1383\(02\)00187-0](https://doi.org/10.1016/S0020-1383(02)00187-0)
- [2]. Kienast B, Thietje R, Queitsch C, Gille J, Schulz A, Meiners J. Mid-term results after operative treatment of rockwood grade III-V acromioclavicular joint dislocations with an AC-hook-plate. *European journal of medical research*. 2011;16(2):52-6. <https://doi.org/10.1186/2047-783X-16-2-52> [PMid:21463981 PMCid:PMC3353421]
- [3]. Yoon JP, Lee B-J, Nam SJ, Chung SW, Jeong W-J, Min W-K, et al. Comparison of results between hook plate fixation and ligament reconstruction for acute unstable acromioclavicular joint dislocation. *Clinics in orthopedic surgery*. 2015;7(1):97-103. <https://doi.org/10.4055/cios.2015.7.1.97> [PMid:25729525 PMCid:PMC4329540]
- [4]. Gorbaty JD, Hsu JE, Gee AO. Classifications in brief: Rockwood classification of acromioclavicular joint separations. Springer; 2017. <https://doi.org/10.1007/s11999-016-5079-6> [PMid:27637619 PMCid:PMC5174051]
- [5]. Longo UG, Lamberti A, Maffulli N, Denaro V. Tissue engineered biological augmentation for tendon healing: a systematic review. *British medicalbulletin*. 2011;98(1):31-59.<https://doi.org/10.1093/bmb/ldq030><https://doi.org/10.1093/bmb/ldx003>
- [6]. Woodmass JM, Esposito JG, Ono Y, Nelson AA, Boorman RS, Thornton GM, et al. Complications following arthroscopic fixation of acromioclavicular separations: a systematic review of the literature. *Open access journal of sports medicine*. 2015;6:97. <https://doi.org/10.2147/OAJSM.S73211> [PMid:25914562 PMCid:PMC4401206]
- [7]. Borbas P, Churchill J, Ek ET. Surgical management of chronic high-grade acromioclavicular joint dislocations: a systematic review. *Journal of shoulder and elbow surgery*. 2019;28(10):2031-8.<https://doi.org/10.1016/j.jse.2019.03.005> [PMid:31350107]
- [8]. LinHY W, Ho W. ClavicularhookplateMayinducesubacromialshoulderimpingementandrotatorcufflesiondynamicsonographicevaluation. *OrthopSurgRes*. 2014;9:6.
- [9]. Cook JB, Shaha JS, Rowles DJ, Bottoni CR, Shaha SH, Tokish JM. Clavicular bone tunnel malposition leads to early failures in coracoclavicular ligament reconstructions. *The American journal of sports medicine*. 2013;41(1):142-8. <https://doi.org/10.1177/0363546512465591> [PMid:23139253]
- [10]. Rylander LS, Baldini T, Mitchell JJ, Messina M, Justl Ellis IA, McCarty EC. Coracoclavicular ligament reconstruction: coracoid tunnel diameter correlates with failure risk. *Orthopedics*. 2014;37(6):e531-e5.<https://doi.org/10.3928/01477447-20140528-52> [PMid:24972433]
- [11]. Moorthy V, Chen JY, Lee M, Ang BFH, Lie DTT. The UCLA Shoulder Score Is a Better Predictor of Treatment Success Than the Constant and Oxford Shoulder Scores After Arthroscopic Rotator Cuff Repair: A 2-Year Follow-Up Study. *Arthroscopy, sports medicine, and rehabilitation*. 2021;3(2):e485-e90.<https://doi.org/10.1016/j.asmr.2020.11.003> [PMid:34027459 PMCid:PMC8129435]
- [12]. Xu S, Chen JY, Lie HME, Hao Y, Lie DTT. Determination of threshold scores for treatment success after arthroscopic rotator cuff repair using Oxford, constant, and University of California, Los Angeles shoulder scores. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*. 2019;35(2):304-11.<https://doi.org/10.1016/j.arthro.2018.07.047> [PMid:30473455]
- [13]. Amstutz HC, Al SH, Clarke IC. UCLA anatomic total shoulder arthroplasty. *Clinical orthopaedics and related research*. 1981(155):7-20. <https://doi.org/10.1097/00003086-198103000-00002>
- [14]. Oza NS, Ganesh A, Singh AK, Das PB, Singh A, Verma D. Minimally Invasive Plate Osteosynthesis in Humeral Shaft Fractures via AnteriorApproach.2021.<https://doi.org/10.18410/jebmh/2021/146>
- [15]. UCLA Shoulder Tating Scale. *Journal of Orthopaedic Trauma*. September 2006;20(8):S139 - S40.<https://doi.org/10.1097/00005131-200609001-00047>
- [16]. Hemmann P, Koch M, Guehring M, Bahrs C, Ziegler P. Acromioclavicular joint separation treated with clavicular hook plate: A study of radiological and functional outcomes. *Archives of Orthopaedic and Trauma Surgery*. 2021;141(4):603-10. <https://doi.org/10.1007/s00402-020-03521-4> [PMid:32588137]
- [17]. Faraj A, Ketzler B. The use of a hookplate in the management of acromioclavicular injuries. Report of ten cases. *Acta orthopaedica belgica*. 2001;67(5):448-51.
- [18]. Tan H-L, Zhao J-K, Qian C, Shi Y, Zhou Q. Clinical results of treatment using a clavicular hook plate versus a T-plate in Neer type II distal clavicle fractures. *Orthopedics*. 2012;35(8):e1191-e7.<https://doi.org/10.3928/01477447-20120725-18>

- [19]. Chen C-H, Dong Q-R, Zhou R-K, Zhen H-Q, Jiao Y-J. Effects of hook plate on shoulder function after treatment of acromioclavicular joint dislocation. *International journal of clinical and experimental medicine*. 2014;7(9):2564.

Shrawan Kumar Thapa, et. al. "Functional outcome of surgery in acute acromioclavicular joint dislocation using a Hook Plate: A retrospective observational study." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 21(01), 2022, pp. 08-12.