

Surgical Outcomes After Fixation of Acromioclavicular Joint Dislocation with Hook Plate and Coracoacromial Ligament Transfer Technique

Konstantin Mitev^{1,2*}, Gorgi Zafiroski¹, Sasho Mladenovski¹, Ljupcho Nikolov¹

¹Special Hospital for Surgical Disease Zan Mitrev, Skopje, Republic of Macedonia; ²Univesity Goce Delchev, Faculty of Medical Sciences, Shtip, Republic of Macedonia

Abstract

Citation: Mitev K, Zafiroski G, Mladenovski S, Nikolov Lj. Surgical Outcomes After Fixation of Acromioclavicular Joint Dislocation with Hook Plate and Coracoacromial Ligament Transfer Technique. Open Access Maced J Med Sci. <https://doi.org/10.3889/oamjms.2019.198>

Keywords: Acromioclavicular joint; Hook plate; Coracoacromial ligament

***Correspondence:** Konstantin Mitev. Special Hospital for Surgical Disease Zan Mitrev, Skopje, Republic of Macedonia; Univesity Goce Delchev, Faculty of Medical Sciences, Shtip, Republic of Macedonia. E-mail: konstantin.mitev@filipvtori.com

Received: 04-Feb-2019; **Revised:** 03-Mar-2019; **Accepted:** 05-Mar-2019; **Online first:** 13-Mar-2019

Copyright: © 2019 Konstantin Mitev, Gorgi Zafiroski, Sasho Mladenovski, Ljupcho Nikolov. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0)

Funding: This research did not receive any financial support

Competing Interests: The authors have declared that no competing interests exist

BACKGROUND: Treatment of acute and chronic acromioclavicular joint dislocations is still controversial. We aimed evaluation of surgical outcomes after using the combined technique with a hook plate and transposition of the coracoacromial ligament in the treatment of acromioclavicular dislocation.

CASE PRESENTATION: During two years 4 patients (2 acute and 2 chronic cases) were operated with this technique. Three male and one female with an average 37 (26-43) years old were: three on the right and one of the left side. Rockwood classification was used. The evaluation was done according to Constant score - preoperatively, 3 months after the operation and 3 months after the titanium plate was removed.

CONCLUSION: Evaluation of the effectiveness using this combined technique show excellent result in all four patients. No surgical site infection and the favourable cosmetic result were present.

Introduction

Treatment of acute and chronic acromioclavicular joint dislocations is still controversial. Surgical treatment is indicated for fixation of complete acromioclavicular joint dislocation what means rupture of acromioclavicular and coracoclavicular ligaments [1]. Acromioclavicular (AC) joint injuries often occur in men in their third, or fourth decade of life due to fall from a height, fall on an outstretched arm and sports injuries. Most of the surgical techniques involve reconstruction of the coracoclavicular ligament and transfer of the coracoacromial ligaments to improve surgical

outcomes [2]. A lot of modification of the surgical techniques are described to enhance the mechanical stability of the acromioclavicular joint.

Case Presentation

Between 2015 and 2017 we operate four acromioclavicular joint dislocation gr. V according to the Rockwood classification system (Figure 1).

Three of them were male, and one was female. Mean age was 37 years old (36-39).

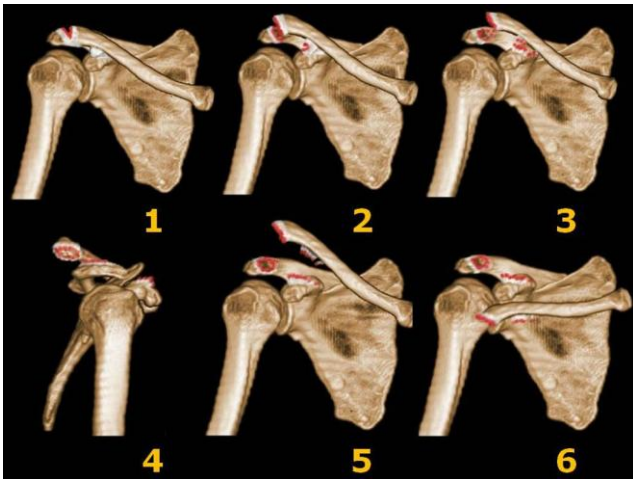


Figure 1: Rockwood classification image

Two of the dislocations were acute treated – until three weeks from the injury, and two of them were chronic more than one month from the injury.

Hook plate was removed between 6-9 months to all patients. Mean follow up was an average of 12 months (11-15 m). The evaluation was done preoperatively, 3 months postoperatively and three months after removing the hook plate. The constant score was used for the evaluation of the surgical outcomes (Figure 2).

Constant Shoulder Score

Clinician's name (or ref) Patient's name (or ref)

Answer all questions, selecting just one unless otherwise stated

During the past 4 weeks.....

<p>1. Pain</p> <p><input type="radio"/> Severe</p> <p><input type="radio"/> Moderate</p> <p><input type="radio"/> Mild</p> <p><input type="radio"/> None</p>	<p>2. Activity Level (check all that apply)</p> <p><input type="checkbox"/> Unaffected Sleep</p> <p><input type="checkbox"/> Full Recreation/Sport</p> <p><input type="checkbox"/> Full Work</p>
<p>3. Arm Positioning</p> <p><input type="checkbox"/> Up to Waist</p> <p><input type="checkbox"/> Up to Xiphoid</p> <p><input type="checkbox"/> Up to Neck</p> <p><input type="checkbox"/> Up to Top of Head</p> <p><input type="checkbox"/> Above Head</p>	<p>4. Strength of Abduction (Pounds)</p> <p><input type="checkbox"/> 0</p> <p><input type="checkbox"/> 1-3</p> <p><input type="checkbox"/> 4-6</p> <p><input type="checkbox"/> 7-9</p> <p><input type="checkbox"/> 10-12</p> <p><input type="checkbox"/> 13-15</p> <p><input type="checkbox"/> 15-18</p> <p><input type="checkbox"/> 19-21</p> <p><input type="checkbox"/> 22-24</p> <p><input type="checkbox"/> >24</p>
<p>RANGE OF MOTION</p> <p>5. Forward Flexion</p> <p><input type="checkbox"/> 31-90 degrees</p> <p><input type="checkbox"/> 91-90 degrees</p> <p><input type="checkbox"/> 91-120 degrees</p> <p><input type="checkbox"/> 121-150 degrees</p> <p><input type="checkbox"/> 151-180 degrees</p>	<p>6. Lateral Elevation</p> <p><input type="checkbox"/> 31-90 degrees</p> <p><input type="checkbox"/> 91-90 degrees</p> <p><input type="checkbox"/> 91-120 degrees</p> <p><input type="checkbox"/> 121-150 degrees</p> <p><input type="checkbox"/> 151-180 degrees</p>
<p>7. External Rotation</p> <p><input type="checkbox"/> Hand behind Head, Elbow forward</p> <p><input type="checkbox"/> Hand behind Head, Elbow back</p> <p><input type="checkbox"/> Hand to top of Head, Elbow forward</p> <p><input type="checkbox"/> Hand to top of Head, Elbow back</p> <p><input type="checkbox"/> Full Ellevation</p>	<p>8. Internal Rotation</p> <p><input type="checkbox"/> Lateral Thigh</p> <p><input type="checkbox"/> Buttock</p> <p><input type="checkbox"/> Lumbosacral Junction</p> <p><input type="checkbox"/> Waist (L3)</p> <p><input type="checkbox"/> T12 Vertebra</p> <p><input type="checkbox"/> Intercapular (T7)</p>

Figure 2: Constant score evaluation form

Surgical techniques - Coracoacromial ligament transposition and hook plate

Patients were operating in the beach-chair position, using transversal incision over the acromioclavicular joint. We use the modifications of the original Weaver-Dunn procedure which include distal resection of the clavicle, transfer of the detached coracoacromial ligament with the addition of a hook plate to improve clinical results and surgical outcomes from the fixation (Figure 3, and 4).

The objective evaluation involves the range of shoulder motion, and subjective assessment includes patient satisfaction and pain score.

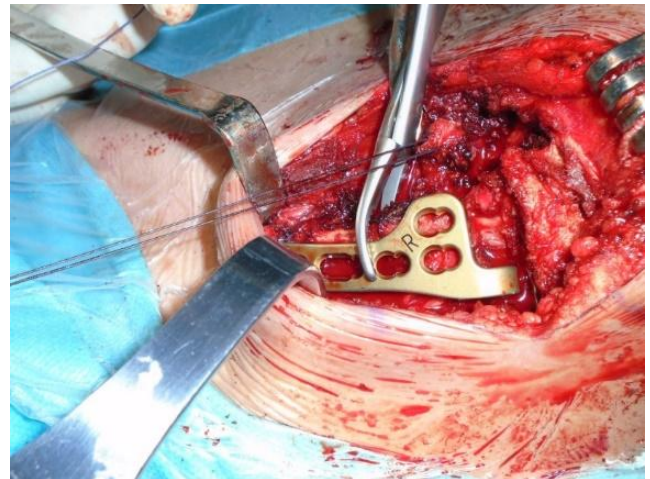


Figure 3: Intraoperative view image

We use Constant score for evaluation of surgical outcomes, and we noted average result 91.5 (88-96) at three months after removal of the hook plate (Table 1).

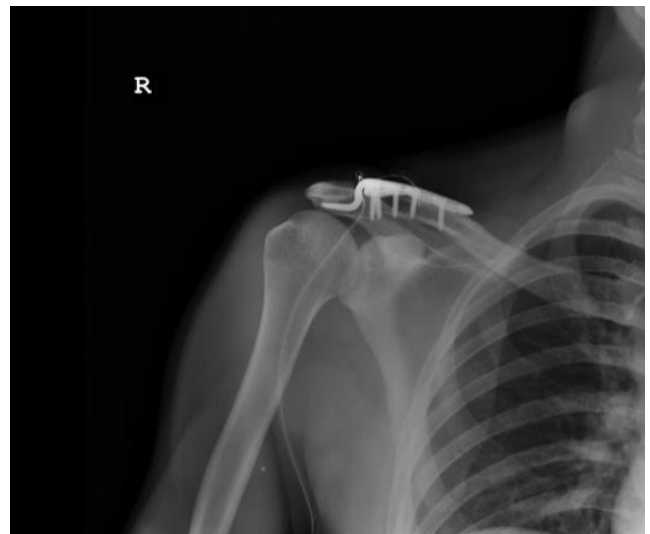


Figure 4: Postoperative x-ray

All of the patients were satisfied with the clinical results, with favourable cosmetic appearance and with an excellent range of motion (Figure 5).

Table 1: Demographic results and surgical outcomes

Sex	acute\chr	mechanism	age	side	type	Preoperative	Constant score 3 postop	after removal
1 st male	acute	fall from height	43	right	type V	45	87	92
2 nd female	chronic	fall on shoulder	38	sin	type V	67	85	88
3 rd male	acute	sport injury	40	right	type V	53	87	96
4 th male	chronic	fall on arm	27	right	type V	72	85	90

We had one patient with impingement syndrome so, we remove the plate sixth month postoperatively, and one patient develops superficial wound infection which response to wound debridement and oral antibiotic administration.



Figure 5: Clinical results

Discussion

The original method for the surgical treatment of acromioclavicular dislocation is the transfer of the coracoacromial ligament to the end of clavicle [1], [3], [4].

Von Heideken et al. presented excellent surgical outcomes treating acromioclavicular joint dislocations type V using hook plate [2].

The main difference between the modifications of the original surgical technique Weaver–Dunn operation depends from placing the coracoacromial fixation subcoracoid using suture loops [5] or putting the anchors directly to the coracoid, [6]. Another described modification of what we were using-consists of the addition of a hook plate [7]. A comparative study was published by Rolf et al., between two groups of patients, one treated in the acute period and the second one in the chronic phase after unsuccessful conservative treatment. In both groups, the modified Phemister surgical technique was used. According to the results, surgical outcomes were significantly better in the group of patients which was operated in the acute period [9]. Similar results were noted from Mignani et al., comparing results between acute and delayed surgical treatment of the acromioclavicular dislocation. They use the same technique with resection of the distal clavicle and fixation with k-wires. Difference between the clinical results of the two groups was not statistically significant for acute treated injuries [10].

In conclusion, we can accept that this modification of the original Weaver–Dunn procedure with the addition of a hook plate to enhance the mechanical stability of the fixation could be an

effective method for treating unstable injuries in acromioclavicular joint.

References

1. Cisneros LN, Reiriz JS. Management of chronic unstable acromioclavicular joint injuries. *J Orthop Traumatol*. 2017; 18(4):305–318. <https://doi.org/10.1007/s10195-017-0452-0> PMID:28275882 PMCID:PMC5685976
2. von Heideken J, Boström Windhamre H, Une-Larsson V, Ekelund A. Acute surgical treatment of acromioclavicular dislocation type V with a hook plate: superiority to late reconstruction. *J Shoulder Elbow Surg*. 2013; 22:9–17. <https://doi.org/10.1016/j.jse.2012.03.003> PMID:22521386
3. Boileau P, Old J, Gastaud O, Brassart N, Roussanne Y. All-arthroscopic Weaver–Dunn–Chuinard procedure with double-button fixation for chronic acromioclavicular joint dislocation. *Arthroscopy*. 2010; 26(2):149–160. <https://doi.org/10.1016/j.arthro.2009.08.008> PMID:20141978
4. Weaver JK, Dunn HK. Treatment of acromioclavicular injuries, especially complete acromioclavicular separation. *J Bone Joint Surg Am*. 1972; 54-A:1187–1194. <https://doi.org/10.2106/00004623-197254060-00005>
5. Boström Windhamre HA, von Heideken JP, Une-Larsson VE, Ekelund AL. Surgical treatment of chronic acromioclavicular dislocations: a comparative study of Weaver–Dunn augmented with PDS-braid or hook plate. *J Shoulder Elbow Surg*. 2010; 19:1040–1048. <https://doi.org/10.1016/j.jse.2010.02.006> PMID:20452245
6. Shin SJ, Yun YH, Yoo JD. Coracoacromial ligament reconstruction for acromioclavicular dislocation using 2 suture anchors and coracoacromial ligament transfer. *Am J Sports Med*. 2009; 37:346–351. <https://doi.org/10.1177/0363546508324968> PMID:19022989
7. Liu HH, Chou YJ, Chen CH, Chia WT, Wong CY. Surgical treatment of acute acromioclavicular joint injuries using a modified Weaver–Dunn procedure and clavicular hook plate. *Orthopedics*. 2010; 11:33(8).
8. Weinstein DM, McCann PD, McIlveen SJ, Flatow EL, Bigliani LU. Surgical treatment of complete acromioclavicular dislocations. *Am J Sports Med*. 1995; 23:324–331. <https://doi.org/10.1177/036354659502300313> PMID:7661261
9. Rolf O, Hann von Weyhern A, Ewers A, Boehm TD, Gohlke F. Acromioclavicular dislocation Rockwood III–V: results of early versus delayed surgical treatment. *Arch Orthop Trauma Surg*. 2008; 128:1153–1157. <https://doi.org/10.1007/s00402-007-0524-3> PMID:18038141
10. Mignani G, Rotini R, Olmi R, Marchiodi L, Veronesi CA. The surgical treatment of Rockwood grade III acromioclavicular dislocations. *La Chirurgia degli organi di movimento*. 2002; 87(3):153–61. PMID:12701467