

Clinical Results of Flexible Coracoclavicular Fixation with Fiber Tape in Acromioclavicular Dislocation. A Retrospective Study

José Tomás Echeverría Ubilla¹, Maximiliano Rosenkranz Caroca² and Felipe Cichero Zamorano^{1*}

¹Department of Orthopaedics, Clínica Dávila, Chile

²Department of Orthopaedics, Clínica Dávila, Universidad de los Andes, Chile

*Corresponding Author: Felipe Cichero Zamorano, Department of Orthopaedics, Clínica Dávila, Chile.

Received: August 25, 2020

Published: September 29, 2020

© All rights are reserved by **Felipe Cichero Zamorano, et al.**

Abstract

Background: The injury to the acromioclavicular joint is very common in the young athlete population. Treatment, depending on the type of injury, can be conservative or surgical. There are multiple surgical options described in the literature for these injuries and there is no consensus regarding the best surgical technique. The objective of this study is to describe the clinical results of the surgical management of acromioclavicular dislocations with the use of a double loop of subcoracoid Fiber Tape.

Methods: We retrospectively reviewed the cases of acromioclavicular dislocations that required surgery (Rockwood types IIIb, IV, V and VI) between 2014 and 2017, operated by the same surgical team in the same center. In all cases, the surgical technique included the fixation with double loop of subcoracoid Fiber Tape. All patients were assessed radiographically and clinically using The Constant Score and The Disabilities of the Arm, Shoulder and Hand Score at six months follow-up. All patients underwent the same rehabilitation protocol.

Results: A sample of 124 patients with acromioclavicular dislocation treated with open surgery was obtained. The average age was 35 years. The mean post-operative Constant score was 93. The mean post-operative Disabilities of the Arm, Shoulder and Hand Score was 6.2. There were 3 cases of minimal loss of range of motion, 21 cases of slight loss of radiological reduction, and 4 cases of mild pain at 6 months of follow-up, but all without clinical repercussion in their activities of daily life. There was 1 case of complete loss of reduction (handled in another rehabilitation center). All the patients returned to their usual activities, including work and sports.

Conclusion: The postoperative results were satisfactory, and the complication rate was low with this technique. The fixation with double loop of subcoracoid fiber tape is a valid surgical option for the management of acromioclavicular dislocations.

Keywords: Acromioclavicular Dislocation; Coracoclavicular Fixation; Fibertape; Surgical Management

Abbreviations

CS: Constant Score; CC: Coracoclavicular; FT: FiberTape®; DASH: Disabilities of the Arm, Shoulder and Hand

Introduction

Injuries of the acromioclavicular joint account for 3 to 5% of all shoulder injuries and can reach up to 50% of shoulder injuries in athletes [1]. Most of these injuries are low grade lesions, mostly

sprains, being more frequent in men [5:1] and with a higher incidence in the 3rd decade of life [2]. In 1984, Rockwood described his classification by separating these lesions into 6 different types. Type I is a sprain of AC and CC ligaments. Type II is a rupture of the AC ligaments and a sprain of the CC ligaments. Type III is a complete rupture of the AC and CC ligaments with a vertical displacement of the clavicle between 25 to 100% compared to the contralateral side. Type IV is a complete rupture of both AC and

CC ligaments with a posterior displacement of the clavicle. Type V is a complete rupture of the AC and CC ligaments with a vertical displacement of the clavicle between 100 to 300% compared to the contralateral side. And type VI is a complete rupture of both AC and CC ligaments with inferior displacement of the clavicle [3]. The management of these injuries is not totally clear in the literature but there is general consensus that depends on the type of injury, degree of displacement and magnitude of the symptoms. Types I and II are managed conservatively, with rest, analgesia, sling for the first weeks to begin a process of physical therapy. The difference between these two types is that type II will require a longer period of rest and rehabilitation [4].

Type III handling is controversial. It has been proposed to manage all type III conservatively for 3 weeks, and once this period is reached, separate them into stable or unstable lesions (IIIA and IIIB respectively) [5]. They can also be classified as acute or chronic (more or less than 4 weeks) which determines the surgical technique to be used. Surgery is proposed in the literature for types IV, V and VI [4]. Over 150 surgical techniques have been described, which shows that there is no gold standard for the surgical management of this pathology. The surgical techniques can be classified as anatomical and non-anatomical procedures for the management of acute and chronic injuries, and also as open or arthroscopically assisted procedures [2,4].

We present a retrospective evaluation of the clinical results of our technique in which we perform a flexible acromioclavicular fixation with FiberTape® (FT, Arthrex) suture in patients with acromioclavicular dislocation.

Purpose of the Study

The purpose is to show a new, minimally invasive technique with good results that can be reproduced in other centers

Materials and Methods

Data covering the period between January 2014 to December 2017 was obtained from the clinical registry at our institution (Clínica Dávila). Patients diagnosed with acromioclavicular dislocations that required surgery and classified as Rockwood types IIIb, IV, V and VI were included in this study. All patients with incomplete clinical records were excluded. Demographic information (age and sex), mechanism of injury, Rockwood classification, surgical techniques and complications were retrieved. In all cases,

the surgical technique included the fixation with double loop of sub coracoid FT (Figure 1). Patients underwent pre and post-operative radiograph evaluation with comparative acromioclavicular view (Figure 2).

The primary objective of the study is the functional assessment using the Constant Score (CS) and the Disabilities of the Arm, Shoulder and Hand (DASH) score that were obtained at the beginning and six months of follow-up respectively. The secondary objective is the loss of reduction at 6 months of follow-up with radiograph. The research needed to conduct the present study was approved by the ethics committee at our institution.

Figure 1: A-B: subcoracoid approach of 4 cm. C-D: Access to the coracoid process and vicryl suture passage below the coracoid. E: Double strand FT suture under the coracoid process with the help of previously placed vicryl. 2 hole brocade in distal clavicle with 2.5 mm drill. FT type suture passage through the clavicle holes. Both strands can be seen passing through each hole and below the coracoid. F: Fascial and skin closure

Figure 2: Pre and post-operative radiographs of a type IIIb acromioclavicular dislocation. It shows how the reduction of the acromioclavicular joint and the reduction of the coracoclavicular distance is achieved the FT technique.

Results and Discussion

A sample of 124 patients with acromioclavicular dislocation treated with open surgery was obtained. The average age was 35 years (18 - 68). Men were affected more with a rate of 20:1. The mechanisms of injury included: Fall at the walking level or practicing contact sports resulting in direct trauma at shoulder level (66%), riding bicycles, motorcycle or car traffic accidents.

The preoperative study included imaging with radiographs in all cases. The radiographic findings included 12 cases of type IIIB acromioclavicular dislocation and 112 cases of type V acromioclavicular dislocation. There were no cases of type IV or VI in this sample. Seven patients consulted after 6 weeks of evolution, so they required surgery with chronic technique. In all cases, the surgical technique included the fixation with double loop of subcoracoid FT, but in the seven chronic cases a modified Weaver-Dunn surgery was added. The mean post-operative CS was 93. The mean post-operative DASH was 6.2 at six months.

Radiographic control at 6 months showed an anatomical acromioclavicular joint in the majority of cases, showing 21 cases of slight loss of radiographic reduction (up to 20% of loss of reduction), none of which showed clinical repercussion. There were also three cases of minimal loss of range of motion and 4 cases of mild pain at 6 months of follow-up, but without any restriction for their activities of daily life. There was 1 case of complete loss of reduction, which did not require a second surgery and without clinical repercussion. There were 2 cases of reoperation at 6 months due to persistent pain in which a SLAP lesion was diagnosed as a cause of pain. All the patients returned to their usual activities, including work and recreational sport (none of the patients were high performance athletes).

The same rehabilitation protocol was applied to all patients. For the first four weeks the patients were splinted with a shoulder immobilizer. From the fifth week on, physical therapy began, dedicating the first two months to gain mobility range, and since the thirteenth week physical therapy was dedicated to gain strength. Activities without restrictions were allowed at six months.

Discussion: Acromioclavicular dislocation occurs more frequently in men with rates of 5:1. In our series was much more frequent for men with a rate of 20:1 perhaps because in our environment until today men are more frequently those who practice contact sports, compared to other countries where women have

increased their practice of these sports [8]. The most frequent mechanism is a direct trauma to the shoulder, which is confirmed in our group being direct trauma the most frequent cause (66%) [7].

There are several studies that show the efficacy of non-surgical treatment for low-grade lesions (types I and II). The management for these types of injuries consists of rest, analgesia and physical therapy [8,9]. Type III lesions have historically been managed non-surgically because surgery in this group has shown little benefit (same range of movement for surgical and non-surgical groups) and a high rate of complications (re-dislocation, failure of surgery, migration of pins, recurrence of deformity, cosmetically displeasing scar and the necessity to remove fixation devices) when compared with the non-surgical group [10]. On the other hand, Gumina, *et al.* and Schlegel, *et al.* have shown functional alterations and scapular dyskinesia in patients with type III lesions managed without surgery [11,12]. Because of this, there is controversy in the management of type III lesions, and this is why we rely on the consensus of ISAKOS to differentiate them into stable or unstable [5]. A similar situation occurs in high-grade lesions such as Rockwood type V, in which they have historically been managed surgically. There are articles, like Dunphy, *et al.* that show that these lesions could be managed conservatively maintaining acceptable functional results [13]. Our team has determined that the lesions that are indications of surgery are: type IIIB, IV, V and VI.

There are multiple surgical techniques. None of these is considered until today as a gold standard, because they all have shown similar results [14]. There are some centers where Bosworth screw is still used. It has shown good functional results with 7.8 years of follow-up [15]. A systematic review included coracoclavicular (CC) ligament reconstruction with free tendon graft, suspensory devices, synthetic ligament devices, coracoacromial ligament transfer and hook plate and K wires showing good functional outcomes and low reoperation [16].

Another systematic review and meta-analysis that included suture only, Endobutton with suture, TightRope, GraftRope, synthetic artificial ligament, tendon graft, and Weaver-Dunn coracoacromial ligament transfer, showed an overall failure rate of 20.8% and overall pooled complication rate of 14.2%. The most common was infection in 6.3% of cases. Other complications were coracoid or distal clavicle fracture in 5.7% and hardware failure in 4.2%. There were no differences between open and arthroscopic techniques with respect to loss of reduction, overall complication rate, and revision rate [17].

A total of 124 surgically treated patients were included in our series. Of these, 117 were operated with acute technique (fixation CC with double loop of subcoracoid FT) and 7 with chronic technique (fixation CC with double loop of subcoracoid FT plus modified Weaver-Dunn). Comparing our results with the available literature, these were good and excellent with an average CS of 93 and an average DASH Score of 6.2 at six months. The radiological results were similar with those described in other series. A systematic review showed that an average of 14% of the operated cases lost reduction [10]. In our study, only 17% had a slight loss of radiographic reduction, without impact in clinical results. This has been shown in other series, where loss of reduction does not correlate with symptoms [18].

Systematic reviews and available meta-analyses have shown that surgery, for high-grade lesions, achieve good functional results and return to previous activities [15-17]. This is consistent with our results. We had 2 cases of reoperation at 6 months, in which a symptomatic SLAP lesion was diagnosed as the cause of persistent pain and required arthroscopic repair. The literature shows that there are lesions associated with acromioclavicular dislocation, but these are often asymptomatic and rare in young patients. In our series, only 1.6% showed associated injuries that required repair. All the patients returned to their usual activities, including work and recreational sport.

Conclusion

Acromioclavicular dislocation is a frequent shoulder injury that occurs more frequently in men. The main mechanism is the direct trauma on the shoulder. Surgery is an option for the treatment of high-grade acromioclavicular dislocations, and the fixation with double loop of subcoracoid fiber tape is a valid alternative that offers good and excellent functional results with low complication rates, with a CS of 93 and DASH score of 6.2 at the postoperative and 6 months follow-up respectively, comparable with that published in the literature. The loss of radiological reduction in post-operated patients is not accompanied by deterioration in functional results and these patients can return to their activities prior to the injury.

Conflict of Interest

None.

Bibliography

1. Yewlett A., et al. "Acromioclavicular joint dislocation: diagnosis and management". *Journal of Shoulder and Elbow Surgery* (2012): 81-86.
2. Sirin E., et al. "Acromioclavicular joint injuries: diagnosis, classification and ligamentoplasty procedures". *EFORT Open Reviews* 3 (2018): 426-433.
3. Gorbaty J., et al. "Classifications in Brief: Rockwood Classification of Acromioclavicular Joint Separations". *Clinical Orthopaedics and Related Research* 475 (2017): 283-287.
4. Li X., et al. "Current Concepts Review: Management of Acromioclavicular Joint Injuries". *Journal of Bone and Joint Surgery American* 96 (2014): 73-84.
5. Beitzel K., et al. "ISAKOS Upper Extremity Committee Consensus Statement on the Need for Diversification of the Rockwood Classification for Acromioclavicular Joint Injuries". *Arthroscopy* 30.2 (2014): 271-278.
6. Mazzocca A., et al. "Evaluation and treatment of acromioclavicular joint injuries". *American Journal of Sports Medicine* 35 (2007): 316-329.
7. Joukainen A., et al. "Results of operative and nonoperative treatment of Rockwood types III and V acromioclavicular joint dislocation. A prospective, randomized trial with an 18- to 20-year follow-up". *American Orthopaedic Society for Sports Medicine* 2 (2014): 1-9.
8. Pallis M., et al. "Epidemiology of acromioclavicular joint injury in young athletes". *American Journal of Sports Medicine* 40 (2012): 2072-2077.
9. Mouhsine E., et al. "Grade I and II acromioclavicular dislocations: Results of conservative treatment". *Journal of Shoulder and Elbow Surgery* 12 (2003): 599-602.
10. Giuseppe U., et al. "Surgical versus conservative management of Type III acromioclavicular dislocation: a systematic review". *British Medical Bulletin* 122 (2017): 31-49.
11. Gumina S., et al. "Scapular dyskinesia and SICK scapula syndrome in patients with chronic type III acromioclavicular dislocation". *Arthroscopy* 25 (2009): 40-45.
12. Schlegel T., et al. "A prospective evaluation of untreated acute grade III acromioclavicular separations". *American Journal of Sports Medicine* 29 (2001): 699-703.
13. Dunphy T., et al. "Functional outcomes of type V acromioclavicular injuries with nonsurgical treatment". *The Journal of the American Academy of Orthopaedic Surgeons* 24 (2016): 728-734.
14. Beitzel K., et al. "Current concepts in the treatment of acromioclavicular joint dislocations". *Arthroscopy* 29 (2013): 387-397.

15. Tiefenboeck T, *et al.* "Acromioclavicular joint dislocation treated with Bosworth screw and additional Kwiring: results after 7.8 years – still an adequate procedure?". *BMC Musculoskeletal Disorders* 18 (2017): 339.
16. Moatshe G, *et al.* "Acromioclavicular and Coracoclavicular Ligament Reconstruction for Acromioclavicular Joint Instability: A Systematic Review of Clinical and Radiographic Outcomes". *Arthroscopy* (2018): 1-17.
17. Gowd A, *et al.* "Current Concepts in the Operative Management of Acromioclavicular Dislocations: A Systematic Review and Meta-analysis of Operative Techniques". *The American Journal of Sports Medicine* (2018): 1-15.
18. Vascellari A, *et al.* "Clinical and radiological results after coracoclavicular ligament reconstruction for type III acromioclavicular joint dislocation using three different techniques. A retrospective study". *JOINTS* 3.2 (2015): 54-61.
19. Arrigoni P, *et al.* "Associated Lesions Requiring Additional Surgical Treatment in Grade 3 Acromioclavicular Joint Dislocations". *Arthroscopy* (2014): 6-10.

Assets from publication with us

- Prompt Acknowledgement after receiving the article
- Thorough Double blinded peer review
- Rapid Publication
- Issue of Publication Certificate
- High visibility of your Published work

Website: <https://www.actascientific.com/>

Submit Article: <https://www.actascientific.com/submission.php>

Email us: editor@actascientific.com

Contact us: +91 9182824667