

Original Article

Outcomes of acromioclavicular joint dislocation using tightrope arthroscopy

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Abstract: Background: Based on different treatment outcomes and different treatment methods for acromioclavicular dislocation, we decided to evaluate the treatment outcomes of acromioclavicular joint dislocation using tightrope arthroscopy. Methods: This retrospective cross-sectional study was performed on patients with acromioclavicular joint dislocation referred to Alzahra Hospital in Isfahan and Abadan-Iran from 2015 to 2017. Information that was assessed included age, sex, type of dislocation (Figure 1), duration of injury, cause of injury, complications such as osteoarthritis, changes in the distance between the joints, as well as the American Shoulder and Elbow Surgeons Shoulder Score (ASES) were collected after 6 months of surgery. Results: There was a significant relationship between horizontal change instability and type of injury that 9 cases (60%) of type 5 of injury and 0 of type 3 had horizontal change instability ($P=0.01$). There was a reverse significant correlation between ASES score and duration of injury ($r=-0.58$, $P=0.01$). Conclusion: Acromioclavicular joint dislocations could successfully be treated with the TightRope system. We also showed that patient's pain and functions are diversely correlated with injury durations.

Keywords: Acromioclavicular, dislocation, tightrope, arthroscopy

Introduction

Acromioclavicular joint injuries are a common problem that accounts for more than 12% of shoulder injuries [1, 2]. The spectrum of acromioclavicular joint injuries can range from a simple strain with very mild consequences to severe dislocations and rupture of the fascia, rupture of the coracoclavicular ligament, and consequently severe shoulder dysfunction [3, 4]. The goal of dislocation treatment is to return the patient to pre-injury activity with a goal of power, painless, and mobile shoulder joint. For joint reduction and repair or reconstruction of the coracoclavicular ligament, the part of VI to IV treatment type is used for surgical treatment [5, 6]. A 2013 study found that more than 150 different surgical techniques were performed to treat acromioclavicular joint injuries [7]. Therefore, the ideal treatment is still debated [5].

One of the most widely used methods with good results is the technique of distal clavicle extraction and displacement of the coracoacromial ligament [8]. Since the introduction of this technique, several methods of this technique have been proposed, each of which has its advantages and disadvantages and usually involves the use of a coracoclavicular fixator [1, 9, 10]. So far, many techniques have been introduced for the treatment of acute acromioclavicular joint dislocations, which has made it very difficult to compare the results and choose the preferred method [6, 11].

There are usually four methods used to treat acromioclavicular joint dislocation, each with its advantages and disadvantages, and several methods have been proposed for each of them. One of the most common of these techniques is proposed by Weaver and Dunn, which is a non-anatomical method. The distal end of the clavicle is cut and removed, and the coracoacromial

Acromioclavicular joint dislocation

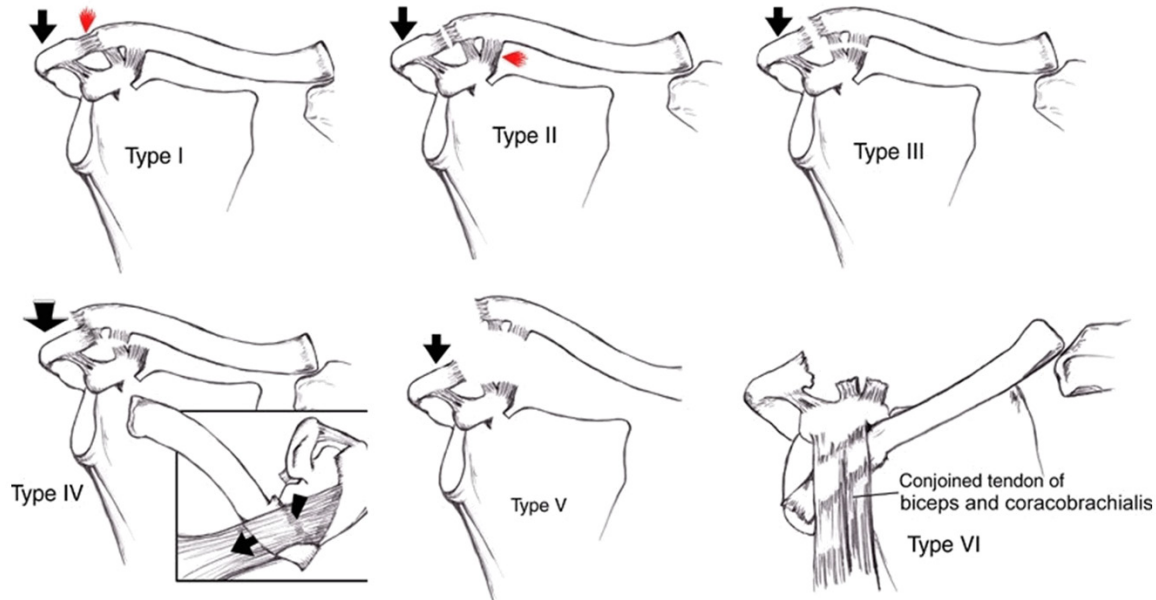


Figure 1. Type of dislocation of shoulder.

ligament is moved to the end of the clavicle to act as the coracoclavicular ligament [12-14].

Previous studies have evaluated outcomes of different techniques in single-arm studies and also comparative projects and reported various results. It has been established that the surgical outcome could be dependent on population characteristics and socio-economic factors. Due to different treatment outcomes and different treatment methods in this dislocation, we decided to evaluate the treatment outcomes of acromioclavicular joint dislocation using tigtrope arthroscopy.

Methods and materials

Study design

This is a retrospective cross-sectional study that was performed on patients with acromioclavicular joint dislocation referred to Alzahra and Imam-Khomeini Hospitals affiliated to Isfahan University of Medical Sciences and Abadan University of Medical Sciences from 2015 to 2017. The study protocol was approved by the Research Committee of Abadan University of Medical Sciences and the Ethics Committee has approved it.

Inclusion and exclusion criteria

Inclusion criteria were patients with acromioclavicular joint dislocation using tigtrope

suture arthroscopy, age over 18 years and signing the written informed consent to participate in the study. The exclusion criterion was incomplete or incorrect patient information.

Data collection

Demographic data of all patients such as age, sex, type of dislocation (**Figure 1**), duration of injury and cause of injury were collected.

We also collected data regarding surgical complications including osteoarthritis, and changes in the distance between the joints within 6 months after surgeries. The American Shoulder and Elbow Surgeons Shoulder Score (ASES) were also assessed for all patients after 6 months. ASES is a mixed outcome reporting measure, applicable for use in all patients with shoulder pathology regardless of their specific diagnosis. This score was developed in 1994 to assess the condition of the shoulder, regardless of disease pathology.

The ASES is a composite instrument, requiring both a physician assessment and a patient-completed portion; however, it is commonly presented as solely the patient-reported survey. The ASES is a 100-point scale that consists of two dimensions: pain and activities of daily living. There is one pain scale worth 50 points and ten activities of daily living worth 50 points. Here in the present study, we used

Acromioclavicular joint dislocation

Table 1. Basic information of patients

Variables		Mean ± SD	Min-Max
Age (year)		29.26 ± 6.70	18-45
Duration of injury (day)		7.16 ± 6.51	1-30
Variables		Frequency (n=23)	Percent
Gender	Male	19	82.6
	Female	4	17.4
Job	Heavy work	3	16.7
	Employee	4	22.2
	Student	3	16.7
	sport	6	33.3
	Other	2	11.1
Type of Injury	3	7	30.4
	5	16	69.6
Cause of injury	Falling	16	72.7
	Trauma	6	27.3

Table 2. The amounts of ASES before and after surgeries

Variables	Mean ± SD	Min-Max
ASES before surgeries	65.28 ± 3.60	57-68
ASES after surgeries	84.65 ± 5.97	70-92
P-value	<0.001	

ASES: American Shoulder and Elbow Surgeons Shoulder Score.

ASES questionnaire to evaluate the patient's pain.

Statistical analysis

Data were entered into SPSS statistical software version 24. Quantitative data were shown as mean and standard deviation and qualitative data as frequency and percentage. Paired tests were used to compare quantitative data changes and, if necessary, chi-square and independent t-tests were used. We also used Pearson analysis test to determine the correlation between different variables. P less than 0.05 was considered as a significant level.

Results

Study population

In this study, 23 cases including 19 males and 4 females with a mean age of 29.26 ± 6.70 years were enrolled. The most of patients were sport workers (33.3%) and the most common type of injury was type 5 (69.6%). The basic information of patients is summarized in **Table 1**.

Post-surgical measurements

The means of duration of injury, ASES and distance change were 7.16 days, 84.65 and 2.54 mm, respectively. The amounts of ASES before and after surgeries are summarized in **Table 2**. The horizontal change instability was in 42.9% of cases and the cause of injury in 72.7% of cases was falling (**Table 3**).

Horizontal change instability

There was a significant relationship between horizontal change instability and type of injury that 9 cases (60%) of type 5 of injury and 0 of type 3 had horizontal change instability (P=0.01) but there was no significant relationship between the type of injury and other variables (P>0.05). Also, there was no significant relationship between horizontal change instability and other variables (P>0.05).

Further assessments

Also, there was no significant relationship between the cause of injury and other variables (P>0.05). There was a reverse significant correlation between ASES and duration of injury (r=-0.58, P=0.01) but there was no significant relationship between ASES and other variables (P>0.05).

Discussion

In the present study, 23 cases with acromioclavicular joint dislocations were entered. We showed that the most common type of injury was type 5. Furthermore, our data showed that the horizontal change instability was in 42.9% of cases and the cause of injury in 72.7% of cases was falling. We also indicated that there was a reverse significant correlation between ASES and duration of the injury. These data showed that using an arthroscopic procedure with tightrope suture was a successful method for patients with acromioclavicular joint dislocations. There have been some previous data on this issue.

A study was conducted by El Sallakh and others in 2012 on 10 patients with acromioclavicular joint dislocations. They also showed that the arthroscopic treatment of acute acromioclavicular dislocation using the TightRope is a mini-

Acromioclavicular joint dislocation

Table 3. Post-surgical variables

Variables	Mean ± SD	Min-Max	
Distance change (mm)	2.54 ± 2.65	0-8	
Variables	Frequency (n=23)	Percent	
Type of Injury	3	7	30.4
	5	16	69.6
Horizontal change instability	No	12	57.1
	Yes	9	42.9

mally invasive surgical technique that brings beneficial results, less morbidity, less hospitalization, and excellent cosmeses [15]. Another study was performed by Frank and colleagues in 2015 about the acromioclavicular joint reconstruction with the TightRope device. They described the surgical techniques for acromioclavicular joint reconstruction and showed that using the TightRope device and showed that the duration of injury has a reverse correlation with the function of the shoulder in patients [16]. These results are in line with the findings of our study. We showed that acromioclavicular joint reconstruction using the TightRope device is a beneficial method for patients.

Another study was conducted by Chaudhary and others in 2015 on 17 patients. They evaluated the arthroscopic fixation for acute acromioclavicular joint disruption using the TightRope device and indicated that arthroscopic fixation using the TightRope device for acute acromioclavicular joint dislocation achieves a satisfactory outcome. They also explained that this procedure is minimally invasive with the lowest complications compared to other techniques [17]. This issue was also described by Motta and colleagues in 2014, emphasizing the effectiveness of arthroscopic stabilization with TightRope [18]. Zhang and others also performed a study on 24 patients with acute acromioclavicular joint dislocation in 2017. They described that TightRope reconstruction of the acromioclavicular joint is a reproducible and safe alternative to many other techniques of acromioclavicular joint reconstruction. Early subluxation remains a concern and may reflect the need for technique modification [19]. These data are also in line with our findings which show that arthroscopic fixation of acromioclavicular joint dislocation is a beneficial and effective method.

On the other hand, in a study by Thiel and colleagues in 2011, 11 patients with grade IV and V acromioclavicular joint disruption were treated with arthroscopic procedures. In this trial, they showed that arthroscopic treatments are beneficial and are associated with improvements in patient's pain and functions however, a high rate of fixation failure with the TightRope system was also reported [20]. These data

are somehow in line with our findings but we observed no fixation failure or any complications following treatments. These variations could be due to differences in the study populations.

Conclusion

Taken together, here we showed that acromioclavicular joint dislocations could successfully be treated with the TightRope system. We also showed that patient's pain and functions are diversely correlated with injury durations. These results were indicated in previous studies. We also suggest that physicians and orthopedic surgeons should pay more attention to this surgical technique especially in patients with type 5 injuries.

Disclosure of conflict of interest

None.

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Acromioclavicular joint dislocation

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