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MODERN ATTITUDE IN THE TREATMENT OF ACROMIO-CLAVICULAR DISPLACEMENT

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Abstract

The acromioclavicular joint dislocation represents a common shoulder injury that frequently occurs to young and active individuals. Most of these AC lesions can be treated conservatively but high-grade dislocation need surgical treatment. There are numerous surgical techniques described in literature for treating this injury. The surgeons must choose between open reduction with internal fixation and arthroscopic fixation, which is the latest technique developed. The aim of this study is to evaluate the functional results and the level of pain after an arthroscopic fixation using a TightRope system to treat AC dislocation. It is a less invasive technique, allowing a stable fixation of the joint. In our study we analyzed 48 patients with acute acromioclavicular dislocation, all of them surgically treated using an arthroscopic method with a single TightRope device. An important reduction in pain perception was achieved at six months after the surgery, comparing with the preoperative moment. No system failure was recorded. Arthroscopic treatment of AC dislocation with the use of TightRope system is an efficient technique which can correct deformity and restore full range of motion in a short period of time.

Keywords: acromioclavicular joint dislocation, arthroscopic technique, functional results

Introduction

Acromioclavicular dislocation is a traumatic lesion of the joint which consist in a displacement of the clavicle to the acromion. It is a common injury that can occur at any age.

The incidence of acromioclavicular dislocation is about 4 per 100000 people. Half of them are met at person who play different sports (25% to 52%), such as football, handball or martial arts [1]. From all shoulder lesions, acromioclavicular dislocation represents 9 percent [2].

Individuals who are involved in vehicle crashes also have a higher risk of acromioclavicular (AC) injurie because of the direct trauma to the shoulder [3]. Males have a five-time higher risk of AC joint injuries than females. Because of the participation in high-risk activities, individuals under 35 years old sustain more injuries than older ones [4].

Commonly an acromioclavicular joint injury occurs falling onto the shoulder, having the arm adducted. The top of the shoulder is pushed down, keeping the clavicle in its position,
leading to different ligaments lesions or to a fracture if a higher force is applied.

Acromioclavicular ligaments are the first ones affected. Acromioclavicular displacement appears if the energy perpetuates and is transmitted to the coracoclavicular ligaments. The deltoid and trapezius muscles can be disrupted and penetrated by the lateral side of the clavicle in case of a major traumatism [5].

Many surgical procedures have been described to treat this affection. Acromioclavicular joint fixation with different types of implants, reconstruction of coracoclavicular interval and transfer of coracoacromial ligament are some of the most used surgical techniques.

First surgical techniques described for AC joint treatment were K-wires or pins fixation. Nowadays surgeons avoid using these techniques due to high risks of implant migration or loss of reduction [6].

Our study aimed to assess functional results after reconstruction of Rockwood grade III and V acromioclavicular dislocations using arthroscopy-assisted coracoclavicular TightRope.

Materials and methods

During 2013-2017, 48 patients with acromioclavicular joint dislocations have been operated in the Orthopedic-Traumatology Clinic of SUUB using the TightRope System.

The TightRope System is a device that consists of two buttons - one round clavicle button and one oblong coracoid button, joined by #5 FiberWire.

Gender, age and the traumatic mechanism were taken into consideration. Rockwood classification was used to classify AC dislocation (Figure 1). Patients mean age was 37 years (range 23-46 years). 35 of them were male. 24 patients have suffered a trauma playing sports, 10 had a car crush, 11 have fallen on their shoulder on the street and 3 of them were victims of aggression.

A radiographic evaluation was done before and after surgery and for all the follow-up visits at six weeks, three and six months using standard anteroposterior views of the shoulder.

The surgeries were performed by the same operating team. Patients were placed in bench chair under a general anesthesia with interscalene brachial plexus block. A standard posterior portal was made, and the arthroscope was introduced into the glenohumeral joint, followed by an anterosuperior portal through the rotator cuff and an anteroinferior portal. A shaver blade was used until the base of coracoid was visualized. A 1-cm skin incision was made.
over the midline of the clavicle, perpendicular to the coracoid process. An incision in the deltotrapezius fascia is made to identify center of the clavicle. A guidance pin is passed through the clavicle and the coracoid base. With a cannulated drill we made a 4-mm tunnel. Guiding pin is removed. (Figure 2).

An 18” Nitinol suture passing wire was passed down through the Cannulated Drill and grasped with the arthroscopic grasper. Traction sutures and oblong button are advanced through the bone using this wire loop until it is placed, flipped and locked under the coracoid. Nitinol wire was then drawn out (Figure 3).

Manual reduction of the dislocated joint was made. Under arthroscopic visualization the sutures were tied over the endobutton placed on the top of the clavicle. The wounds were then closed in layers.

Patients went home the next day after the procedure. The period of postoperative immobilization was for 3 days, in a sling, then they were sent to kinesiotherapy procedures. They were released for their daily activities after 3 weeks. After they recovered full range of motion patients were allowed to return to sports.

Results

The functional results were evaluated using the UCLA shoulder rate scale, which has a maximum score of 35 points. It showed good results (difference between normal and abnormal side 3-9 points) at six weeks, for all cases, with a mean value for the affected side of 31 points and excellent results at six months with a mean value of the score of 33 points.

Preoperative coracoclavicular mean distance was 22 mm. After the surgery it improved to a mean value of 11.8 mm. At six weeks follow up visit mean value was 12.1 mm which means a loss of 0.3 mm. All measurements were made on anterior-posterior radiographs (Figure 4).

The pain level recorded before surgery using Visual Analogue Scale (VAS) was 8.4 and improved by the six weeks follow up visit to 1.9.

In 42 cases, patients were satisfied by the results of the surgery. They recovered full range of motion of glenohumeral joint and returned to their daily activities six weeks.

For 5 cases the results were unsatisfactory due to pain that impaired the high demand activities of the patient.

During the follow-up period there was no patient with loss of reduction or with suture breakage.

Functional results registered for our series show good recovery at six weeks, with almost normal levels of activity at six months after surgery for the majority of the patients.

None of the cases showed any sign of system failure due to suture wire breakage, knots untying or migration of the endobuttons through the bone when analyzing the radiographic images.

All cases presented reduction six weeks postoperatively.
Discussions

Conservative, non-surgical treatment of acromioclavicular dislocation can have satisfactory results when it is used for low-grade injuries like type I and II. In cases of full displacements, such as types IV, V, VI, when the main objective is to reconstruct the coracoclavicular ligaments, surgical treatment is preferred.

Treatment of type III ACD is controversial, between conservative treatment and surgical treatment. A decision must be made on individual cases and on surgeon’s experience. In a study made by Nissen and Chatterje they recommend conservative treatment for type III ACD [7].

There are many surgical techniques described in the literature, from which the surgeon can choose, each of them with advantages and disadvantages [8]. None of them have been proved as gold standard technique.

Surgical procedures that use metallic implants carry a series of risks linked to high invasiveness and the need for early or late removal of the implants, with insufficient soft tissue healing to allow adequate stabilization. Furthermore, the reconstruction procedures of the vertical, coracoclavicular stabilizing structures are associated with large soft tissue dissection.

Because the AC joint needs good mobility, a flexible type of fixation is needed because it allows dynamic fixation during the healing process of the natural stabilizing structures of the joint. Systems based on suture wires and metallic endobuttons or fixation anchors have been developed during the last years for treating different lesions in a dynamic manner. These techniques provide sufficient fixation until the soft tissue structures heal and provide stability. In the same time the rehabilitation process is more efficient, with faster functional recovery and fewer surgery complications. In a study conducted by Walz et al about biomechanical properties of tightrope, they showed that it has the same resistance forces as coracoclavicular ligaments [9].

To our knowledge, the first reported experience of the use of this arthroscopic technique was published in 2006 [10]. Since arthroscopic techniques have been developed, more and more surgeons use this method to treat acromioclavicular dislocations, with minimum soft-tissue invasion. Full inspection of shoulder can also be made to evaluate and treat different injuries such as labral lesions.

The literature confirms the effectiveness of the Tight-Rope system with results similar to ours, which reinforces the effectiveness of the method and thus encourages the application of this minimally invasive procedure [10-12].

The symptomatology, especially pain levels know an important improvement by six
weeks postoperatively, which renders good patient satisfaction for the daily living activities.

Fracture of the clavicle is a major complication that can occur when tunnels through the bone are drilled. Milewski et al showed in a study that the rate of fractures was 10%. To avoid this complication, it is necessary to drill the tunnels through the center of the bone and to ensure that there is adequate bone from the tunnel to the lateral side of the clavicle. In our study there was no case with clavicle or coracoid fracture.

The data regarding failure of fixation yields more controversial results showing low rates of failure reported by Chaudhary et al., Spoliti et al. and Sallakkh on one side and results published by Flinkkilä et al. after evaluating a larger series (57 cases) with up to 16% percent early failure, mostly due to suture breakage on the other. This may suggest that early failure can be most often attributed to wire rupture [13].

The rate of surgical infections is lower for Arthroscopic techniques comparing with open reduction techniques. In our study, the rate of superficial infection was 2.08% with no case of deep infection after arthroscopic acromioclavicular reconstruction. These results are similar with those presented in literature about the rate of infection [14].

Conclusions

Arthroscopic treatment of acromioclavicular dislocation with TightRope is a less invasive surgically technique, with good results in restoring range of motion in a short period of time. Arthroscopic repair using the TightRope has a lower risk of infection, soft tissue lesions and requires no additional surgery for hardware removal. It also can detect another intraarticular pathology.

References


