ARTHROSCOPIC TREATMENT OF ACUTE ACROMIOCLAVICULAR JOINT DISLOCATION USING SUTURE ANCHORS

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ABSTRACT

Objective: To present the clinical and radiographic results of a case series of patients with acute acromioclavicular dislocation (AAD) treated by arthroscopic coracoclavicular fixation with suture anchors. Method: Twenty patients with AAD with less than 30 days since the injury were submitted to a coracoclavicular stabilization procedure using 2 suture anchors placed at the base of the coracoid process. Each suture anchor was connected to 2 strands of No.2 nonabsorbable-braided sutures, which were passed through the holes drilled in the clavicle and tied to the upper surface of the clavicle. The coracoclavicular distance was measured and compared to the opposite side using radiographic evaluation. Constant and UCLA scores were used to determine clinical and functional evaluation after 6 months. Results: Of the initial twenty cases, six were submitted to a new surgical procedure and were excluded from the study. Of the fourteen patients remaining, only two maintained the initial reduction, while the remainder presented some degree of reduction loss. The Constant and UCLA score averages were 94.79 (82-100) and 32.64 (26-35) respectively. Conclusion: The technique had a high incidence of reduction loss after 6 months of follow up. The clinical and functional evaluation was satisfactory, with a high average score. Level of Evidence: Level III, retrospective study.

Keywords: Acromioclavicular joint. Dislocations. Arthroscopy.

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INTRODUCTION

Acute acromioclavicular dislocation (AAD) is responsible for 9% of traumatic lesions of the shoulder girdle, and between 40 and 50% of sports injuries located in the shoulder. Most (43.5%) occur in young adults around the age of twenty,[1-3] with greater incidence in males (5:1).[4]

The most common classification is that of Rockwood,[5] which considers clinical, anatomical and radiographic aspects, dividing it into types, where in types III, IV and V the clavicle appears dislocated.

As regards treatment, type III AADs are still a controversial subject in literature, with a current tendency for conservative treatment. However, several authors prefer to treat it surgically, which is the case of type IV and V, indicating this procedure in young patients, with symptomatic instability, in athletes and in manual workers.[4-7]

There are several surgical techniques for the treatment of AAD, and coracoclavicular fixation with subcoracoid ligation is preferred by many authors. The open technique is the most frequently performed surgical technique, with the advantages of allowing direct viewing of AC joint reduction, being the easiest procedure in technical terms, offering the chance to remove any degenerative material from the disc, enabling precise identification of the origins of the coracoclavicular ligaments and having a shorter surgical time. As a disadvantage, it produces a more prominent scar and aggression to the deltoid insertion.[4,8-11]

With the refinement of implants and of the arthroscopic technique, it became possible to treat AAD with this method, since it offers less surgical aggression and a smaller scar, not causing harm to the deltoid insertion. Moreover, it enables better intra- and extra-articular inspection, thus allowing the identification and treatment of associated lesions.[8,9,12,13]

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One option for the surgical treatment of AAD is coracoclavicular stabilization with use of two suture anchors,[12,14,15] loaded with two highly resistant, non-absorbable suture threads, fixed in the coracoid process and sutured in the clavicle through bone tunnels.
The aim of this study is to present the clinical, functional and radiographic results of a series of cases with AAD treated surgically by arthroscopic approach, with CC fixation using metallic suture anchors.

CASUISTRY AND METHOD

Twenty patients diagnosed with AAD and operated in our service using the coracoclavicular fixation technique with suture anchors in the period from October 2006 to January 2008 were treated initially. All the cases were operated with less than 30 days of evolution, with a mean time of 12.63 days between the trauma and surgery. The twenty patients were all male and the mean age was 33 years.
In twelve cases the dislocation occurred on the right side and in eight, on the left side. Five cases (25%) were initially classified as Rockwood type III and fifteen (75%), as type V. No patient presented associated lesion in the diagnosed shoulder before the surgical procedure. In eight patients the trauma resulted from a motorcycle accident, in seven from a fall from standing height with direct trauma to the shoulder and in five from other mechanisms that involved probable direct trauma to the shoulder. (Table 1)

Table 1. *Age, gender, laterality, classification of the lesion according to Rockwood and time to surgery.*

Patient	Age	Gender	Side	Classification	Time to surgery (Days)
1	30	M	R	5	10
2	24	M	R	5	16
3	27	M	R	3	18
4	35	M	L	3	16
5	38	M	L	3	21
6	27	M	L	3	15
7	56	M	R	5	11
8	55	M	L	5	12
9	25	M	R	5	6
10	23	M	R	5	10
11	26	M	L	5	11
12	25	M	L	5	30
13	23	M	R	5	7
14	29	M	L	5	12
15	61	M	R	5	10
16	31	M	R	3	10
17	29	M	L	5	17
18	46	M	R	5	4
19	18	M	L	5	11
20	32	M	R	5	5

In the surgical technique used, the surgeon performed standard posterior portal for arthroscopy, intra-articular inspection and evaluation of associated lesions. This is followed by inspection of the subacromial space through the posterior portal. The creation of the lateral and anterosuperior portals is accompanied by preparation of the subacromial space, addressing careful subclavicular debridement. With viewing through the lateral portal, it is possible to find the coracoid process following the coracoclavicular ligament.
Its preparation is performed and two 5.5mm titanium suture anchors (FastIn®RC, DePuy Mitek, Westwood, MA) are inserted with two no. 2 polyethylene threads (Orthocord® DePuy Mitek, Norwood, MA) in each anchor, one positioned posteromedial and the other anterolateral in the coracoid process, as close as possible to the base. After this, a 2cm longitudinal incision is made medial to the acromioclavicular joint with blunt dissection up to the dorsal surface of the clavicle. Four holes are drilled with a 2.5mm bit, then the suture anchor strands are passed through the transosseous holes through the clavicle by arthroscopic visualization. This is followed by careful reduction (longitudinal and horizontal) with arthroscopic control and by palpation through the superior approach. The knots of each strand are tied independently, with arthroscopic knots through the superior approach. The resulting reduction is visualized by arthroscopy and by radiography at the end.
After the procedure, the patients were immobilized with a splint for a period of six weeks, where no movements were made in the first four weeks and the patients were instructed not to remove the splint. Physiotherapy was started after this interval, initially with passive movement, progressing to active movement after two weeks, when the use of the splint was discontinued.
The radiographic evaluations were performed in the immediate postoperative stage, weekly in the first month, monthly up to three months and at six months postoperatively. Both AC joints were x-rayed in an anteroposterior view on a single film, with the patient in the orthostatic position without traction use. In the radiographic analysis, the coracoclavicular distances of both sides were measured and the distance from the operated side was divided by the non-operated side, obtaining a ratio expressed in percentage.
The clinical evaluations were conducted weekly in the first month, monthly up to three months and at six months after surgery, assessing the presence of pain and maintenance of reduction. The Constant[16] and UCLA[17] scores were applied at six months postoperatively.

RESULTS

The procedures were performed by 5 different surgeons. All twenty patients initially selected were submitted to arthroscopy of the affected shoulder. Associated lesions diagnosed during the articular inspection were found in only two cases. A Bankart lesion was found in patient number 17 and reinserted arthroscopically. A type 1 SLAP lesion, lesion of the medial pulley ligament of the long head of the biceps and lesion of the upper portion of the subscapularis, which were not approached, were found in patient number 18. Conversion for open reduction

of the AC joint occurred in only one patient, number 17, who was submitted to Bankart repair.

As regards the radiographic results (Table 2), fifteen cases (75%) presented reduction fifteen days postoperatively, without an increase of the coracoclavicular distance in comparison to the non-operated side. Five cases (25%) exhibited deviations that already varied from 30% to 100% in the first radiographic evaluation, 15 days postoperatively.

In the outpatient follow-up, one patient, number 20, although presenting adequate initial reduction, evolved with complete loss of the reduction at two months post-operatively. This patient, as is the case of the five patients that present reduction loss from 30% to 100% 15 days postoperatively, was excluded from the study and submitted to revision surgery using the open technique.

Of the fourteen remaining patients not excluded from the study, most cases were observed to have progressive loss of the reduction, recorded by the increase of coracoclavicular distance during radiographic follow-up. Only two patients (14.28%) had no changes in the reduction in the six-month evaluation, without deviation in comparison to the normal side. Another four patients (28.56%) presented deviations that ranged from 20% to 25%, compatible with Rockwood classification type III. Eight patients (57.14%) presented deviations of 30% to 120% in the 6-month evaluation. None of these had any history of further trauma of the operated shoulder. No coracoid process anchor loosening was observed in any of the cases.

Table 2. *Functional and radiographic evaluation.*

	X-Ray (%)	X-Ray (%)	X-Ray (%)	Constant	UCLA
Patient	Preoperative	Postoperative (15d)	6 months	6 months	6 months
1	250	100	---	---	---
2	300	0	0	92	32
3	73	40	80	100	35
4	54	0	30	93	30
5	77	0	80	95	33
6	71	0	80	98	35
7	140	0	110	95	35
8	160	0	100	82	26
9	108	60	---	---	---
10	140	0	25	100	35
11	120	0	42	95	32
12	120	0	0	98	33
13	110	0	22	93	31
14	120	0	80	100	35
15	180	0	20	100	35
16	78	30	75	91	33
17	145	75	---	---	---
18	190	0	120	91	33
19	160	0	20	95	32
20*	228	0	---	---	---

* Patient re-operated by open technique

In the functional evaluation of the fourteen patients at 6 months post-operatively, the Constant score ranged from 82 to 100, averaging 94.79, while the UCLA ranged from 26 to 35, averaging 32.64, a value considered good by Ellman's criteria.[18]

DISCUSSION

The main function of the AC joint and of its ligaments is scapular suspension and weight bearing of the upper limb. Loss of suspension may lead to local pain, muscle fatigue, invasion of the acromion over the supraspinatus, neurological symptoms due to traction of the brachial plexus and scapular dyskinesis.[2,19] The aim of surgical treatment in more severe cases of AAD is to minimize such effects.

One of the first forms of AAD treatment was through primary fixation of the AC joint with Kirschner wires, after its reduction. However, this method is seldom performed nowadays due to the infrequent yet catastrophic complications that can arise on account of the breakage and migration of the material.[20]

Ligament reconstructions represent another option for the treatment of AAD. Weaver and Dunn[21] described a technique whereby they de-inserted the acromial portion of the coracoacromial ligament, together with a portion of bone from the acromion and transferred it to the clavicle. A recent change in the technique was the resection of the distal portion of the clavicle to avoid degeneration in the AC joint. Biomechanical studies[11] showed that this technique, when used separately, presents high rates of failure and proves biomechanically inferior to other techniques such as the Bosworth screw, subcoracoid ligation or ligament reconstructions using autologous graft. It has been suggested that this technique should be protected by, for example, the use of subcoracoid ligation during the ligament healing phase.[7] Lafosse *et al*.[13] recently described a totally arthroscopic technique for the treatment of acute and chronic AAD using coracoacromial ligament transfer.

The technique by arthroscopic approach has also been suggested by other authors for reconstruction of the coracoclavicular ligaments using autologous semitendinosus graft[8] or synthetic sutures.[9] The advantages described include preservation of the deltoid muscle insertion and the possibility of treating associated lesions in the same procedure. Moreover, they present more desirable cosmetic results.

Fixation between the coracoid process and the clavicle can also be achieved using a screw, as described by Bosworth.[22] Such technique, although effective and capable of reestablishing AC joint reduction, has the downside of requiring removal of the material and of presenting the inherent risk of breakage or loosening of the screw.

Notwithstanding the diversity of available techniques, as described above, this study focused on the stabilization technique between clavicle and coracoid process, particularly with the use of metallic anchors, which we shall now analyze here.

The stabilization technique between clavicle and coracoid process with the subcoracoid ligation technique, through endobuttons or anchors, has been described by several authors[6-10,12] with satisfactory results. It has the advantage of not requiring removal of the synthesis material, besides having proven effective in the reestablishment and maintenance of AC joint reduction. Its po-

tential complications are suture cut-out, a foreign object reaction (observed mainly with polytetrafluorethylene thread) and possible osteolysis in the clavicle.

The use of suture anchors for fixation in the coracoid process has potential advantages in comparison with the subcoracoid ligation: it reduces surgical time as well as the risk of injury to neurovascular structures (which can occur during the passage of the wire under the coracoid) and avoids displacement of the ligation from the anterior part of the coracoid.[8,10]

Breslow *et al*.[15] compared, in cadavers, the mechanical stability obtained after coracoclavicular stabilization using the subcoracoid ligation technique with the use of suture anchors. Although the group with suture anchors presented slightly superior results, both methods proved statistically similar. The reason why the group with ligation appeared slightly less stable was possibly related to the fact that their sutures were concentrated more at the base of the coracoid process with the start of the applied load, thus generating slight suture looseness.

Literature contains few studies analyzing clinical results of coracoclavicular stabilization treatment with the use of suture anchors[12], whereas they all used the open approach technique. A series of cases of coracoclavicular fixation with metallic anchors using the arthroscopic approach technique was presented in our study.

The use of arthroscopy in this study proved highly valuable, since it presented the advantages of using a minimally invasive approach.[8,9,13] We also emphasize the viability of diagnosis and treatment of lesions associated with AAD not identified in the preoperative period, which was verified in two patients in this study.

The loss of initial reduction has been described in literature, and the imprecise anchor insertion site has been the reason pinpointed by some authors.[12,14] An important fact in this study is the large number of cases with increase of the coracoclavicular distance observed in the postoperative period, higher than those found in literature for the treatment of AAD with suture anchors.[12,14]

In patient number 20, submitted to revision of the surgical procedure, and in the five other patients initially excluded from the study due to loss of the AAD reduction 15 days postoperatively (which were also submitted to revision of the surgical procedure), it was observed that the reduction loss was related to rupture of the wire used in the eyelet of the anchor, not having any connection to the loosening of the suture anchor of the coracoid process or with its poor positioning. We understand that the wire ruptured due to wear and tear in its passage through the suture anchor eyelet, where the wire is submitted to considerable tension force in a small contact area. It is plausible to extend such interpretation to the other twelve cases where there was loss of reduction, in which no alterations were observed in the fixation of the suture anchors in the coracoid process in the control radiographies.

Studies in literature demonstrate that the loss of reduction with consequent subluxation of the AC joint does not affect the final clinical result of the treatment,[4,6,7] which could be confirmed through this study. The Constant and UCLA scores, used for functional analysis of AAD treatment in this study, were high, with mean values of 94.87 and 32.87 having been verified in the Constant and UCLA scores, respectively. Such data evidence good functional recovery with the technique used, even with the poor radiographic results obtained.

CONCLUSION

The fixation technique with suture anchors presented a high rate of loss of initial reduction over a six-month period. The final clinical evaluation, however, presented satisfactory result with high mean score, considered good by Ellman's criteria.

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