Importance of Restoring the Anatomical Characteristics of Coracoclavicular Ligaments After Arthroscopic Reconstruction for High-Grade Acromioclavicular Joint Dislocations

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I have no financial relationships to disclosure
The surgical treatment for acromioclavicular joint (ACJ) separations is recommended for type 5 injuries according to Rockwood’s classification. We have performed anatomic reconstruction of coracoclavicular ligaments (CCL) using arthroscopic procedure from 2008 to present. However, it may be necessary that we consider not only to reconstruct the anatomic CCL as the static or vertical stabilization, but also the dynamic or horizontal stabilization of ACJ. From 2012, we added re-attachment of deltoid muscle as the dynamic stabilization, and repair of the acromioclavicular ligament as the horizontal stabilization of that joint using open techniques to this arthroscopic procedure. We evaluated the necessity to reconstruct the dynamic or horizontal stabilization for type 5 ACJ dislocations.
Surgical methods

   Only arthroscopic reconstruction of CCL
   (Only stabilization for **vertical instability**)

2. Group Hybrid: After August 2012
   Reconstruction of CCL with **deltoid muscle and AC ligament (ACL) repair**
   *Detached deltoid muscle was sutured, and teared ACL was repaired under open technique*
Materials

Subjects: AC joint separation (type 5 using Rockwood’s criteria)
  Acute cases within 3 weeks from injury
  Minimum follow-up is more than one year

Group A: **14 patients** (13 males and one female)
  The age at the time of surgery: 21 ~ 63 years old (mean: 32.2)
  The affected side: right in 9 patients, left in 5 patients
  The duration from injury: 7 ~21 days (mean: 11)

Group Hybrid: **12 patients** (10 males and 2 female)
  The age at the time of surgery: 25 ~ 71 years old (mean: 40.1)
  The affected side: right in 6 patients, left in 3 patients
  The duration from injury: 7 ~21 days (mean: 13.7)
Substitute ligament for CCL

- Palmaris longus
- Artificial ligament
- Continuous loop
- EndButton

Conoid ligament

- Artificial ligament
- EndButton

Trapezoid ligament
Reconstruction of conoid ligament

A: The tunnel direction
B: The tunnel hole on the clavicle
C: The tunnel direction on the sagittal view
Reconstruction of trapezoid ligament

A: The tunnel direction
B: The tunnel hole on the clavicle
C: The tunnel hole on the coracoid process on the sagittal view
Case presentation (Group Hybrid)

(1): The tunnel hole for Trapezoid ligament
(2): The tunnel hole for Conoid ligament
Results

1. UCLA score (30 pt.): 28.9 pt.
2. Alignment of the AC joint:
   - Group A (14 cases): Reduction 9 cases (62.3%)
   - Dislocation 2 cases (14.3%), Subluxation 3 cases (21.4%)
   - Group Hybrid (12 cases): Reduction 11 cases (91.7%)
     Subluxation one case (8.3%)
3. Radiographic findings at final follow-up
   - Osteoarthritic change: one case in Group A, none in Group Hybrid

* There was no significant correlation between two groups (P= 0.09: Mann-Whitney’s U test)
* Two dislocation cases resulted from the disruption of the connection between the palmaris longus and continuous loop
* The time to create a bone tunnel for conoid ligament was less than ten minutes by using original target device
The advantages that arthroscopic procedure can offer over open techniques are less morbidity and the treating associated lesions. The aim of these arthroscopic procedures is to restore only the vertical stabilization of ACJ.

Scheibel M et al. (Am J Sports Med 2011)

The double TightRope arthroscopic technique does not address horizontal plane instability that is also present in ACJ disruptions. They reported signs of posterior instability in 42.9% of patients treated with this technique.

(However, I think that this technique is not anatomical reconstruction of CCL)
Conclusions

The trapezoid and conoid ligament composing CCL were anatomically reconstructed by arthroscopic techniques. It is possible to treat ACJ dislocations by a minimally invasive arthroscopic procedure, and to decrease the incidence of OA of acromioclavicular joint. It is controversial what surgical procedure is recommended for high-grade ACJ dislocations, such as the reconstruction of CCL, CCL with dynamic stabilization, CCL with acromioclavicular ligaments, and CCL with acromioclavicular ligaments and dynamic stabilization. In the future, we think that many studies should investigate the biomechanical influence of deltotrapezoid fascia, acromioclavicular ligaments, and CCL on the stability of ACJ.