



## CONCOMITANCE OF ROTATOR CUFF DISEASE IN SYMPTOMATIC ANTERIOR SHOULDER INSTABILITY

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### ABSTRACT

**Purpose:** To evaluate the concomitance of rotator cuff disease in patients with symptomatic anterior shoulder instability and its impact on the severity of lesions.

**Materials and Methods:** Retrospective data were collected from 326 patients from a single institution for a 16-year period. The demographic characteristics of the patients were selected randomly. The leading diagnosis was shoulder instability. Excluded from the study were patients with posterior (n=24) or mixed instability (n=5). Primary diagnosis was confirmed with clinical findings and MRI imaging studies. All patients from the group underwent arthroscopic surgery. A throughout analysis was performed of the collected materials.

**Results:** 297 patients with primary anterior instability underwent arthroscopic stabilization in the clinic. 25% (n=75) presented with different grade rotator cuff lesions, of which only 33% (n=25) were discovered on MRI preoperatively. In these patients, rotator cuff tenoplasty was performed. In 27% (n=79) of the patients, an evident subacromial space narrowing without rotator cuff lesions was found during arthroscopy. In these cases, a subacromial decompression was performed, and in some of the cases - acromioplasty. In 52% (n=154) of patients who underwent an arthroscopic stabilization for anterior shoulder instability, additional treatment was necessary.

**Conclusions:** The complex analysis of shoulder pathology can shield the surgeon from diagnostic misses and unsatisfactory results. Coexisting rotator cuff disease may have a role in symptomatic anterior shoulder instability as it is often neglected in clinical evaluations due to the main diagnosis of instability.

**Keywords:** rotator cuff disease, shoulder, anterior instability, arthroscopy, instability,

### INTRODUCTION:

The anatomical complex of static and dynamic shoulder stabilizers assures balance between functional mobility and stability of the shoulder joint, as well as the negative joint pressure. The primary static stabilizer of the abducted shoulder is the lower glenohumeral ligamentous complex. The main dynamic stabilizers are the muscles of the rotator cuff – its main role being the movement of the

whole upper extremity. The rotator cuff also delivers passive tension – static force against the proximal translation of the humeral head. In addition, active tension-compression of the humeral head to the glenoid cavity and muscular balance between the muscles of the rotator cuff and the deltoid muscle. [1, 2]

The most critical position of the shoulder joint is with 90 degrees abducted humerus and maximal external rotation (i.e., throwing). The biomechanics of the throwing act illustrates the balance between the functional mobility and stability of the shoulder joint.

Chronic trauma with a similar mechanism (i.e., sportspersons, workers, low-activity patients with sudden high-intensity physical load) is a frequent occurrence and shows the role of the rotator cuff in joint stability, the correlation between evident and hidden instability with rotator cuff disease, and the influence of rotator cuff pathology on the shoulder joint stability, on the other hand. [3, 10]

### MATERIALS AND METHODS:

Retrospective patient data (n=326) was collected from the clinic for a 16-year period – from 2002 to 2018. The including criteria for enrollment in the study were: a primary diagnosis of shoulder instability, undergone arthroscopic stabilization treatment, MRI and other available diagnostic imaging data. Excluded from the study were patients with posterior (n=24) or mixed instability (n=5). A total of 297 patients with evident anterior shoulder instability were evaluated.

The demographic characteristics of the patients were randomized. The impairment affected the dominant side in 238 patients (236 right-handed and 2 left-handed). In our study, 196 patients were male (66%), and 101 were female (34%). The youngest patient was 20 years old, and the oldest patient was 86 years of age. The average age of the participants was 55.3 years. Other demographic characteristics were the following. Body mass index (kg/m<sup>2</sup>) ranged from 23 to 42. The mean BMI was 28.2 with a standard deviation (SD) of 4.44.

A comparison between preoperative MRI and arthroscopic findings was made to evaluate the diagnostic accuracy and to confirm coexisting pathologies. (Table 1)

**Table 1.** Obtained imaging studies data. (n=297)

	Preoperative MRI	Preoperative X-rays	Postoperative follow-up (MRI and/or X-ray data)	Arthroscopy video file
Patient % (n)	68% (202)	100% (297)	33% (98)	89% (265)

An operative arthroscopic procedure was performed by the same two surgeons in the clinic.

Arthroscopic treatment protocol for anterior shoulder instability was standard – liberation and mobilization of the anterior glenohumeral ligamentous complex, followed by preparation and implantation of resorbable anchors in a suitable position on the anterior aspect of the glenoid cavity. This was followed by knotless sutures and stability testing. [4]

After arthroscopic stabilization, an inspection of the subacromial space was carried out routinely. In the cases where there was additional pathology evident – some form of rotator cuff disease, ranging from impingement to moderate rotator cuff tears, an arthroscopic tenoplasty of the rotator cuff was performed – using sutures, and a subacromial space decompression with soft tissue and bone impingement overcoming (bursectomy, coracoacromial ligament resection and acromioplasty). [5, 6] (Table 2)

**Table 2.** Arthroscopic procedures performed. (n=297)

Arthroscopic procedure type	Patients (n, %)
Stabilization with anchors	297 (100%)
Rotator cuff suture	75 (25%)
Subacromial space decompression	79 (27%)
Acromioplasty	39 (13%)

Patients were treated with a standard postoperative protocol with 3-6 weeks of immobilization followed by a rehabilitation program.

Follow-up was performed between 1 month and 17 months postoperatively (Mean: 6 months). 234 patients (79%) were rechecked 1 month and 3 months postoperatively.

**RESULTS:**

From 297 patients who underwent arthroscopic surgery for anterior shoulder instability, 75 patients (25%) presented with different grade rotator cuff lesions. In 27% (n=79) of the patients, an evident subacromial space narrowing without rotator cuff lesions was found during arthroscopy. (Table 3)

**Table 3.** Rotator cuff pathology co-involvement in shoulder instability.

	Rotator cuff tears	Subacromial space narrowing (without rotator cuff lesions)	Isolated anterior shoulder instability
n=297 (100%)	75 (25%)	79 (27%)	143 (48%)
Full-thickness rupture of at least one of the rotator muscles	45/ 75		
Partial-thickness rupture	25/ 75		
Insufficient MRI data/ evident clinical findings	5/75		
Evident arthroscopic findings	50/75 (67%)		

MRI imaging discovered only 33% (n=25) of the partial rotator cuff lesions coexisting with instability in the 75 patient group. The others were discovered during arthroscopic surgery at some point after the stabilization procedure.

According to the Jobe classification for patients with chronic, repeated shoulder pain, the study group was divided as follows. [7] Group 1 – isolated impingement (n=79), Group 2 – Primary instability from chronic microtrauma of the glenoid labrum (n=41), Group 3 – Secondary impingement due to generalized laxity (n=34) and Group 4 – Isolated instability without impingement (n=143).

Complications were also noted. The most major of them were shoulder dislocation (n=1), anchor migration (n=2) and external rotation deficit (n=2). Minor complications comprised of superficial infections (n=29), wound non-closure (n=2) and extensive postoperative scarring (n=1).

**DISCUSSION:**

The main goal when restoring shoulder joint stability is the reconstruction of the capsule ligamentous complex and not only the labrum. Using knotless suture anchors enables secure stabilization be-

cause the technique allows a higher volume of tissue involvement.

When treating the rotator cuff tear, it is important to carefully inspect the shape and extent of the tear and not rely only on MRI preoperative data, as some studies show that partial cuff tears are associated with limited diagnostic accuracy. [8, 13, 16] In addition, evaluation of scarring and tendon retraction is also important for surgery planning in cases of more severe tears. In all cases, rotator cuff lesions should be repaired, whether they are isolated or coexisting in a setting of shoulder instability. Negative provocative tests, few complications and a high level of patient satisfaction after complex arthroscopic treatment in this large retrospective group confirms the importance of a comprehensive approach and careful evaluation and differential diagnosis of pathologies that may affect the shoulder joint apart from instability. [9]

The group with isolated anterior shoulder instability required only arthroscopic stabilization surgery. Nonetheless, in all cases, a subacromial inspection was performed to evaluate concurrent rotator cuff pathology and/or impingement. A subacromial space decompression was carried out to ensure no early rotator cuff disease development.

The moderately high percentage of cases where preoperative data was insufficient in discovering additional pathology shows the importance of arthroscopic inspection. In cases where there is anterior shoulder instability, the surgeon should actively search for concurrent rotator cuff pathology and use the diagnostic purpose of the arthroscopic procedure to its full potential, apart from the therapeutic part. [10, 11]

#### CONCLUSIONS:

Evaluation of possible coexisting pathology in the anteriorly unstable shoulder can shield the surgeon from diagnostic misses and unsatisfactory results. [14, 15] Rotator cuff disease may have a role in symptomatic anterior shoulder instability as it is often neglected in clinical findings due to the main diagnosis of instability. An operative approach for anterior shoulder instability should be always performed in athletes, and young and dynamic people. Elderly patients with moderate to low activity could be less beneficial of a rotator cuff repair, depending on the severity of the lesion. Patients with concomitant severe/ irreparable rotator cuff lesions are candidates for open surgery.

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