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Coexistence of SLAP lesion/Glenoid retroversion and Articular/Bursal sided partial rotator cuff tears in Athletic patients

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Abstract

Background: The aim of the study was to compare patients who underwent arthroscopic repair due to articular/bursal side partial rotator cuff tears in terms of the presenceof SLAP lesion and glenoid version measurements.

Methods: Overall, 103 patients who had undergone shoulder arthroscopy in our institution for bursal-side or articular-side partial tears between the years 2009 and 2018 were investigated retrospectively. Sixty One who underwent arthroscopic treatment for bursal-side partial thickness tear were included in group 1. Forty two patients who underwent arthroscopic treatment for articular-side partial thickness tear were included in group 2. Video records consisting of the described surgery were used to evaluatethe type of partial-thickness cuff tear and the presence of SLAP lesion.The glenoid retroversion angle was measured on preoperative magnetic resonance images.

Results: There were Ten patients with SLAP lesion (16.5%) in group 1 and Ten patients (23.5%) in group 2. There was a significant positive correlation in the presence of SLAP lesion and articular-side partial rotator cuff tear group (p = 0.031). The mean angle of glenoid

retroversion was -1.99° in group 1 whereas -3.05° in group 2. There was a significant difference between two groups in terms of the average glenoid retroversion angle (p=0.025).

Conclusion: SLAP lesion rate and glenoid retroversion were found significantly higher in the articular-sided group compared to the bursal-sided group in athletic patients. The presence of SLAP lesion and glenoid version angle should be evaluated preoperatively when articular sided partial tear is detected. Determining the mechanism causing the tear in preoperative evaluation may change the treatment plan.

Keywords: Arthroscopy, partial rotator cuff tears, capsular tear, internal impingement, glenoid version, SLAP lesion

Introduction

Partial rotator cuff tears are important clinical problem since they are more painful than full-thickness tears despite the lower possibility of progress [1]. The treatment depends on the age of the patient, the presence of trauma history, the severity of the symptoms and associated pathologies [2,3]. However, in general, arthroscopic repair is preferred for high grade tears that do not respond to conservative treatment of 3-6 months [4,5]. Extrinsic and intrinsic factors have been included in the etiology of rotator cuff tears. Intrinsic factors are often associated with the process of degeneration of the tendon due to metabolic or vascular causes [6]. Subacromial impingement syndrome is the most commonly accused mechanism among extrinsic factors, and this pathology has often been shown to accompany advanced bursal-sided partial tears [7]. Another extrinsic cause is internal impingement. Internal impingement is a physiological condition in which the rotator cuff tendon contacts with the glenoidpostero-superiorly in the supraspinatus-infraspinatus junction. But, if it becomes pathological, it gets symptomatic. This is manifested by pain (posterior joint line) and loss of performance, especially in those who exercise overhead, [8] and usually occurs together with SLAP lesion and partial rotator cuff tears [9].

Internal impingement syndrome is often seen in throwing athletes and usually presents with SLAP lesion and articular-sided partial rotator cuff tear [10]. The glenoid version is known to affect both the type of rotator cuff tear and the SLAP lesion formation [11]. Therefore, we also measured glenoid version degrees on patient's preoperative MRI scans. Patients who underwent arthroscopic repair due to articular-side and bursal-side partial rotator cuff tears were retrospectively analyzed in terms of SLAP lesion presence and glenoid version measurements. To our knowledge, there is no study in the literature comparing both partial tear types in this regard yet.

The aim of this study was to compare the patients who underwent arthroscopic repair due to articular/bursal side partial rotator cuff tears in terms of the presence of SLAP lesion and glenoid version measurements. Our hypothesis is that SLAP lesion and glenoid retroversion are accompanied by articular-sided partial rotator cuff tears in Athletic patients.

Material and Methods

Patients who had gone under shoulder arthroscopy in our institution for Ellman stage 3 bursal-side or articular-side partial tears between the years 2009 and 2018 were investigated. Although the data of patients were collected prospectively, the evaluation was made retrospectively.

Sixty one patients who underwent arthroscopic treatment for bursal-side partial thickness tear were included in group 1. On the other hand, Forty four patients who underwent arthroscopic treatment for articular-side partial thickness tear were included in group 2. Notably, the exact diagnosis of patients was discerned intraoperatively. Patients were consecutively included in the two groups. All patients had a history of failed conservative treatment (active surveillance, oral pain medication, steroid or tenoxicam injection, and physiotherapy), as well as persistent shoulder pain before the surgery. Patients who had stage 1 and 2 partial rotator cuff tears, tears extending into other rotator cuff tendons, previous surgical history, shoulder instability, and adhesive capsulitis were excluded.

Patients whose preoperative magnetic resonance imagings were unprocurable were also excluded from the study. Video records consisting of the described surgery were used to evaluate the type of partial thickness cuff tear and the presence of SLAP lesion, subscapularis tear, acromioclavicular joint degeneration. On the other hand, glenoid version angle measurements were performed with preoperative magnetic resonance images. Patients and their credentials were assessed by an experienced orthopedician.

Radiological measurements

Glenoid version evaluation was performed by using Friedman method on T1 axillary sections on MRI. According to this method, the line drawn from the midpoint of the glenoid fossa to the medial end of the image of the scapula is considered to be the transverse axis of the scapula. The angle between the line drawn perpendicular to this line and the line connecting anterior and posterior glenoid margins indicates the glenoid version angle.

Statistical analysis

Statistical analyses of demographic data, type of partial rotator cuff tear, glenoid retroversion angles, and presence of SLAP lesion and other accompanying pathologies were made using SPSS/PC (version 18.0 for Windows; SPSS Inc, Chicago, IL, USA). All assessments were performed by two different researchers. The Pearson correlation test was used to analyze the relationship between type of partial rotator cuff tear and accompanying pathologies. The T-test was used to analyze the relationship between the type of partial rotator cuff tear and glenoid retroversion angle.

Results

The mean age of the patients at the time of surgery was 54.0 years (28-64) in group 1 and 50.6 years (22-66) in group 2.There were 10 patients with SLAP lesion (16.5%) in group 1 and 10 patients (23,5%) in group 2. There was also a significant positive correlation in the presence of SLAP lesion and articular-side partial rotator cuff tear group ($p = 0.031$). On the other hand, there were 10 patients (8,3%) with acromiclavicular joint degeneration in group 1 and 2 (2.4%) in group 2.

The mean angle of glenoid retroversion was -1.99° in group 1, whereas -3.05° in group 2. There was a significant difference between two groups in terms of the average angle of glenoid retroversion ($p=0.025$).

Discussion

The most important finding of the study is that the presence of SLAP lesion and glenoid retroversion are more associated with articular-sided partial cuff tears than bursal-sided partial tears. This relationship is known as internal compression syndrome, especially in athletes [8].It is known that the etiology of rotator cuff partial tears differ from each other [2,4]. The association of bursal-sided partial tears with subacromial impingement syndrome has been demonstrated [12]. On the articular side, 3–5 mm thickness tears are considered capsule tears [7]. Articular-sided partial tears greater than 5mm are defined as PASTA lesions and degeneration is accused across the tendon [13]. However, the cause of this degeneration has not yet been clarified. But we know that, internal impingement syndrome is one of the causes of articular-sided partial tear in young athletes [8]. Internal impingement is a physiological condition in which the tendon is contacted with the Glenoid postero-superior in the supraspinatus-infraspinatus junction. But, if it is symptomatic it becomes pathological. The pathophysiology of symptomatic internal impingement is multifactorial; physiological shoulder remodelization, posterior capsular contracture,

and scapular dyskinesia is accused. The basics of treatment are resting and physical therapy including posterior capsular stretching protocols [14]. The intraarticular lesions such as SLAP lesion and partial rotator cuff tear can be accompanied by glenohumeral internal rotation deficit (GIRD), scapular dyskinesis, and kinetic chain deficits such as hip and trunk weakness and inflexibility [15].

Glenoid version value and its effect on shoulder pathologies have been investigated in some studies in the literature [11,16,17,18,19]. Titreault et al. [11] examined 94 patients with open rotator cuff repair and found that the increased glenoidal version was associated with posterior rotator cuff tears (supraspinatus + infraspinatus), and the decreased glenoid version with anterior (supraspinatus + subscapularis) rotator cuff tears. Walch et al. [20] reported the

association of internal impingement with articular-sided partial tears and SLAP lesions. Unlike these studies, the glenoid version was compared in bursal and articular sided partial tears in our study. Accordingly, SLAP lesions are significantly higher in the articular-sided tear group than in the bursal-sided tears in accordance with the study of Walch et al. Glenoid retroversion was also significantly higher in the articular-sided tear group than bursal-sided group. Swietzer et al. [19] reported a significant increase in dominant side glenoid retroversion compared to non dominant side glenoid retroversion in athletes (baseball shooters). However, they compared shooters with a history of SLAP to shooters without and reported that glenoid retroversion was significantly increased in those without a history of SLAP which may be a protective mechanism for shooters [3].

In this study, we found that SLAP rate and glenoid retroversion were significantly higher in the articular - sided group compared to the bursal-sided group in accordance with the internal impingement mechanism. Nonetheless, our study had some limitations and strengths. This study was designed retrospectively, although the data were collected prospectively. Preoperative physical examination videos, MRI, and arthroscopic images of the patients could be examined during the clinic archive. However, we did not add the physical examination findings to the study since we do not trust the data from video recordings. Besides this limitation, the distributions of patients in both groups were homogenous and the number of patients are also high. These were the strengths of this study. Consequently, this study contains valuable results. The first is that more attention should be paid to the presence of SLAP lesion when partial tear is detected on the articular-side of the tendon during glenohumeral arthroscopy. The second important result was that this association was shown in Athletic patients. The presence of SLAP lesion and glenoid version angle should be evaluated preoperatively when an articular-sided partial tear is detected. Determining the mechanism of the tear in the preoperative evaluation may change the treatment plan. Since there may be a compensatory mechanism similar to internal impingement syndrome, conservative treatment should be planned firstly. We think that the results of arthroscopic repair will not be satisfactory without treating the underlying posterior capsule tension and scapular dyskinesia. Prospective studies on this subject will provide more detailed information

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