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CHAPTER 21

Incidence of Additional Pathologies in the Setting of Arthroscopic Clavicle Distal end Resection

(Murat Saylık)

Incidence of Additional Pathologies in the Setting of Arthroscopic Clavicle Distal end Resection

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1. Introduction

Patients with AC joint degeneration may experience pain anywhere from the middle of the clavicle to the endpoint of the deltoid muscle and encounter limited motion in cross-body and overhead movements of the arm (1). Yet the complexity of the acromioclavicular (AC) joint and its multiple connections to the shoulder area creates potential diagnostic difficulties upon physical examination.

AC joint diarthrosis causes high load on the small joint surface and frequent degeneration of the joint structure. AC joint degeneration, along with cystic lesions at the distal end of the clavicle, osteolysis, and inferior osteophytic elongations in the joint, cause compression on the supraspinatus muscle (2). The condition may be clinically asymptomatic despite MR images showing signs of AC joint degeneration (extension in joint length and widening in joint diameter due to osteophyte development) (3). The rate of asymptomatic cases with AC joint degeneration detected in MR images is between 48% and 82% (4). Symptomatic cases should first be treated conservatively using non-steroid, intra-articular cortisone, inmobilization, or physical therapy (5). In cases where conservative treatment does not achieve results, arthroscopic clavicle distal end resection (CDER) protects the upper-posterior ligament and capsule, does not impair joint stabilization, reduces pain quickly and provides functional recovery in the early period (6).

Due to the complex anatomical structure of the shoulder joint, it is not always possible to diagnose AC joint degeneration and / or additional pathologies through physical examination and imaging methods.

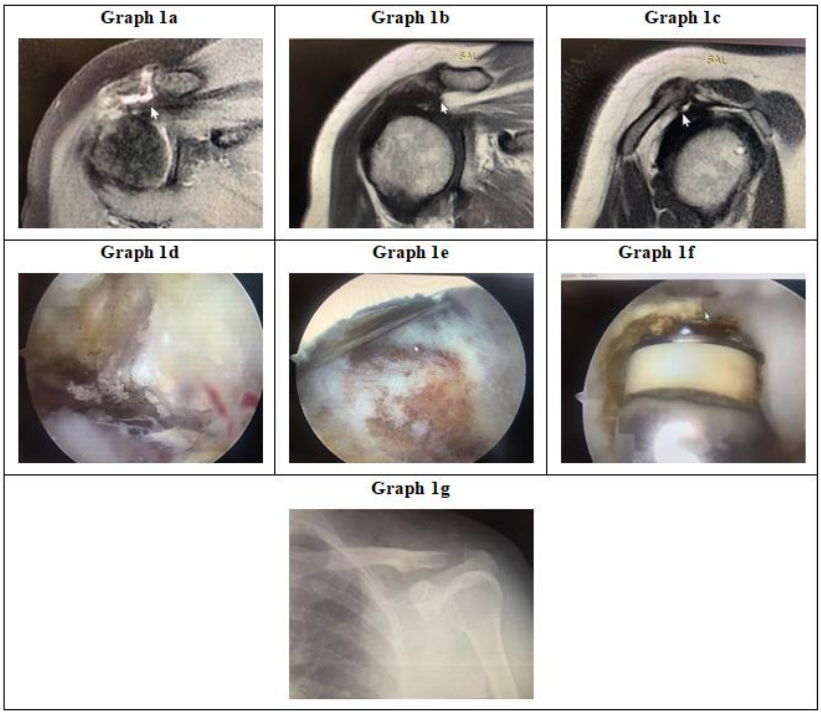
This study aimed to determine the frequency, according to patient age group, of additional pathologies detected during arthroscopic CDER for AC joint degeneration; and to raise awareness for simultaneous treatment of joint degeneration and additional pathologies, where present.

2. Patients and method

This study retrospectively evaluated the arthroscopy video records of 246 patients treated with arthroscopic CDER between February 2014 and February 2020 for whom the transaction code in the hospital information system was recorded. The study included 181 patients who had at least one positive test for symptomatic AC joint degeneration and showed additional pathologies during arthroscopy. Shubin stein classification was used in AC joint degeneration (7). All AC joint degenerations in the study were stage 3 and 4.

Patients who underwent only CDER and were not positive for at least one of the symptomatic AC joint degeneration tests (O'Brien's test, cross-body adduction test, AC joint pain) were excluded from the study. Arthroscopy was performed by the same surgeon, and additional pathologies were documented by examining video recordings. Three main patient age groups were formed: the first group group included patients aged 25-45 (young), the second group patients aged 45-65 (middle age) and the third group over 65 (advanced age). SLAP 2-3 lesions, supraspinatus damage, Type-2, 3 acromion and glenohumeral instability pathologies detected in arthroscopy video recordings were recorded in age groups.

Before shoulder arthroscopy, patients were radiologically evaluated with shoulder MRI (Graph 1a, 1b, 1c). Shoulder arthroscopy was then performed under general anesthesia with each patient in a semi-sitting position. Posterior portal imaging was used for lateral and anterior portal intervention. For image clarity, while blood pressure was kept under 100 mmHg, intraarticular pressure of 40-50 mm Hg was applied with an arthro pump. 3000 cc 0.9% sodium chlorine solution was used for intra-joint pressure and washing. First glenohumeral, and then subacromial joint arthroscopy was performed. Degeneration and inferior compression of the distal end of the clavicle was observed in the AC joint using the lateral and anterior portal in the subacromial joint (Graph 1d). The acromion due to inferior osteophyte was shaved with a burr. CDER was implemented to the extent to which bone burr was made to fit on the anterior portal. The posterior-upper AC joint ligament and capsule were preserved to maintain AC joint stability (Graph 1e). Since the AC joint is anatomically narrower towards the posterior, the CDER was enlarged 1-2 mm more posterior-upper to provide a symmetrical opening. Intra-articular pathologies were resolved in the same session. Primary repair or tenotomy was applied to the most frequently detected SLAP lesion (Graph 1f). The adequacy of CDER was determined by taking shoulder radiography the next day (Graph 1g).



3. Statistical Analysis

Frequency, mean, and standard deviation values were calculated by descriptive statistical methods. Numeric variables were assessed using the ANOVA test. Bonferroni was used as a post hoc test to determine the difference between groups. Dichotomous variables were assessed by crosstabs and Pearson's chi-square test. Pearson correlation coefficient was used to analyze whether significant correlation exists between the parameters. Two-tailed hypothesis was considered in the analyses, and the significant differences were accepted if p value was .05 or less. SPSS 18.0 software for Windows (SPSS, Inc., Chicago, IL, USA) was used in the evaluation of statistical analyses.

4. Findings

There were 181 cases who underwent CDER due to symptomatic AC joint degeneration and who had additional pathology. 98 of the cases were male and 83 of them were female. The mean follow-up time was 37.5 months (range: 3-87 months). Average age was 52.8 years (range: 25-76 years). The mean age was 55.9 in females and 49.1 in males, and there was no significant difference ($p = 0.002$). The rate of those using the right arm is 93.4%. Right

shoulder arthroscopy was performed in 87 patients (48.1%) and left shoulder arthroscopy was performed in 94 patients (51.9%).

Supraspinatus tear was detected in 60 patients; type 2-3 acromion in 80 patients; subscapularis tear in 13 patients; and GH instability (most commonly 144 SLAP lesions) in 20 patients. Other pathologies were detected in 1 in 75 patients, 2 in 80 patients, 3 in 22 patients, and 4 in 4 patients. The distribution of pathologies according to age group is shown in Table 1.

Table 1: Number of additional pathologies according to age groups.

		Number of concomitant intra-articular pathologies.				
		1	2	3	4	Total
Group	25-44	38	17	2	0	57
	45-64	28	42	10	0	80
	>65	9	21	10	4	44
Total		75	80	22	4	181

As patient age increased, the number of additional pathologies increased. A significant positive correlation was observed between the number of additional pathologies and age ($p = 0.000$, $r = 0.494$). There was also a significant positive correlation between supraspinatus tear and age ($p = 0.000$, $r = 0.628$).

Examination of additional pathologies by age group revealed a significant difference between the groups ($p = 0.005$). The number of additional pathologies in male patients in the 25-44 age group was significantly higher than in the other groups; the difference was ($p = 0.02$) with the 45-64 group and ($p = 00.01$) with the group over-65 group. SLAP lesion was the most common pathology seen. There was no significant difference between the groups ($p = 0.066$). Supraspinatus tear increased with increasing age. There was a significant difference between the groups ($p = 0.000$). The incidence of type 2, 3 acromion varied according to age groups. It was most commonly seen in the 45-64 group, and there was a significant difference with the 25-44 group ($p = 0.004$) and the over-65 group ($p = 0.022$). In terms of GH instability, a significant difference was observed in the 25-44 group compared to the other groups ($p = 0.006$). Subscapularis damage did not differ significantly between groups. The incidence of additional pathologies according to age groups and their statistical evaluation are shown in Table 2.

Table 2: Frequency of additional pathologies according to age groups and gender and statistical evaluation between groups

Group	Female/ Male	SLAP	Supraspinatus Tear	Type 2-3 Acromion	Subscapularis Tear	GH instability
25-44	21/36	40	1	18	8	11
45-64	48/32	65	25	47	3	2
>65	29/15	39	34	15	2	7
Total	98/83	144	60	80	13	20
ANOVA (P=)	0.005	0.066	0.000	0.002	0.053	0.004

5. Discussion

The 317 additional pathologies we detected in 181 patients who underwent arthroscopic CDER due to symptomatic AC joint degeneration showed that one should not focus on one pathology. SLAP and acromion compression were the most common in the 25-44 age group. They were also common in the 45-65 age group. SLAP and supraspinatus damage were common in the age group over 65 years. Since additional pathologies are mostly seen in the 44-65 age group, the diagnostic arthroscopy time initially applied during shoulder arthroscopy was kept longer in this age group.

AC joint degeneration causes pain in different parts of the shoulder. The accuracy of tests detecting AC joint degeneration are limited and specific diagnostic difficulties arise (8). Since different shoulder pathologies result in similar findings, using the most advanced imaging methods for detailed clinical examination is insufficient for a definitive diagnosis in the presence of multiple pathologies (9). Among the specific tests for AC joint degeneration, the body cross test can provide 77% sensitivity and the O-Brein test can provide 95% specificity (9,10). The local injection test is nearly 100% effective in the diagnosis of AC joint degeneration (11) and is the gold standard for diagnosing impingement syndrome due to AC joint degeneration, but it does not rule out the presence of additional pathology (12). Injection of the AC joint with USG increases the accuracy of the test (13). If there is edema at the distal end of the clavicle in MRI, AC joint degeneration is often symptomatic, and the pain finding is more pronounced (14). Arthroscopic diagnosis becomes valuable when 82% of the cases with AC joint degeneration are asymptomatic in MRI and the specific tests of the AC joint are not highly correlated with MRI (15). In cases undergoing CDER with open surgery, it has been recommended the resection be placed below 0.5 mm in order to prevent instability due to deltoid fascia, superior AC

ligament and capsule damage (16). In arthroscopic AC joint resection, stability is not impaired because the posterior-superior AC ligament and capsule are preserved, resulting in less pain and improved functional results (17). A cadaver study of the relative degeneration of different parts of the AC joint found joint degeneration to be more severe inferior and anterior to the joint. Osteophytes in the inferior region that develop due to degeneration cause tears by compressing the supraspinatus (18). In alignment with the literature our study prevented instability by preserving the posterior-superior ligament and capsule through arthroscopic CDER.

In the study investigating the pathologies accompanying AC joint degeneration, 42% SLAP and 65% supraspinatus damage in patients under 50 years of age, and 29% SLAP and 86% supraspinatus damage were reported in patients over 50 years of age. The rate of additional pathology seen in symptomatic AC joint degeneration has been reported as 97.7% (19). In our study, similar to those studies found in the literature, SLAP lesion rate decreased and supraspinatus tear rate increased with increasing age. The reason for the proportional decrease in SLAP lesions with increasing age was that the incidence of intra-articular pathologies increased with age.

In a study investigating intra-articular pathologies accompanying SLAP lesion, AC joint degeneration was observed in only 11% of patients, and supraspinatus tear was reported as the most common pathology in SLAP lesion in 40% of patients (20). In our study, since the SLAP lesion was the most common additional deformity, it was thought that impingement due to AC joint deformation was an important factor in the development of SLAP lesions.

In the study group of patients with a mean age of 37 who underwent arthroscopic CDER, the persistence of shoulder pain and functional limitation was reevaluated, and it was found that the source of pain was undetected SLAP lesion. In the etiology of both AC joint degeneration and SLAP lesions, specific trauma, repetitive micro trauma and frequent repetitions of overhead activities are prevalent (21).

Among the causes of shoulder pain that lasted longer than 6 months in cases with arthroscopic CDER, 9.9% of other shoulder pathologies were observed (22). In cases where arthroscopic supraspinatus repair was performed and shoulder pain persisted, it was reported that the source of pain was AC joint degeneration (23). In our study, supraspinatus tear was observed at a rate of 33.1%. This ratio increased with increasing age.

It has been reported that in cases where arthroscopic supraspinatus repair and CDER were performed, the application of CDER does not contribute to pain and functional recovery in the early period, and significantly contributes to them in the medium term (2 years) (24). In frozen shoulder cases with

multiple intra-articular pathologies, AC joint degeneration and other additional pathologies did not affect the functional results (including pain) of arthroscopic capsular release (25).

6. Conclusion

In patients who underwent arthroscopic CDER due to symptomatic AC joint degeneration, 317 additional pathologies were detected. SLAP lesion was most common in the 25-45 age group; SLAP and acromion compression most common in the 44-65 age group; and SLAP and supraspinatus damage most common in the over-65 age group. Diagnostic arthroscopy time was kept long in patients scheduled for CDER due to AC joint degeneration. Additional pathologies detected during arthroscopic CDER were treated in the same session. It was noted that untreated additional pathologies were prevalent in the setting of continued shoulder pain.

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