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MRI EVALUATION OF ROTATOR CUFF TEAR PATTERNS ACCOMPANYING ABNORMALITIES OF BICEPS TENDON, BURSAE AND GLENOID LABRUM IN OS ACROMIALE CASES

Os Akromiyale Olgularında Rotator Manşet Yırtık Tiplerinin, Biseps Tendonu, Bursa ve Glenoid Labrum Anormalliklerinin MRG ile Değerlendirilmesi

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ABSTRACT

Aim: Because most of the published researches use inadequate methods in literature, the relations between os acromiale (OA) and rotator cuff (RC) pathology are not readily defined. The aim of this study was to determine the pathologies of RC, biceps tendon, bursae and glenoid labrum in OA cases with using magnetic resonans imaging (MRI).

Material and Method: Forty-three OA patients with age of 24 years and over were included in the study. Shoulder MRI underwent in all patients. MRI exams were evaluated for pathologies of RC tendons, biceps tendon, bursae and glenoid labrum.

Results: The frequency of OA was found 2.6%, and 81.4% of patients with OA were female. RC tear was found in 38 patients (88.3%). Partial-thickness tear (PTT) of supraspinatus (SS) tendon was present in 31 patients (72%). Twenty-two (70%) of PTTs were as rim-rent tear. Full-thickness tear of SS tendon was detected in seven (16%) patients. Subacromial and subcoracoid bursitis were defined in 31 (72%) and 14 (32%) patients, respectively. Biceps tendon pathology was seen in three (7%) cases. Labral pathology was seen only in one (2%) case.

Conclusion: There is an increased ratio of rotator cuff tears in OA cases. Most of the tears are seen within the SS tendon and tear patern is mostly PTT. There is not found an increased ratio of pathologies related to biceps tendon and glenoid labrum.

Keywords: *Os acromiale, Magnetic resonance imaging, rotator cuff*

ÖZ

Amaç: Literatürde, os akromiyale ile rotator manşet patolojisi arasındaki ilişki; yayınlanmış birçok çalışmadaki yetersiz metodlara bağlı henüz tanımlanmamıştır. Bu çalışmanın amacı, os akromiyale olgularında; rotator manşet yırtık tiplerini, biseps tendonu, bursa ve glenoid labrum patolojilerini MRG ile değerlendirmektir.

Gereç ve Yöntem: Os akromiyalesi olan, yaşı 24 ve üzerinde toplam 43 olgu çalışmaya dahil edildi. Olgulara ait omuz MR incelemeleri; rotator manşet tendon yırtık tipleri, biseps tendonu, bursalar ve glenoid labrum patolojileri yönünden değerlendirildi.

Bulgular: Os akromiyale sıklığı %2,6 bulundu. Olguların %81,4'ünü bayanlar oluşturdu. Rotator manşet yırtığı 38 (%88,3) hastada tanımlandı. Supraspinatus tendonunun parsiyel kat yırtığı 31 (%72) hastada mevcuttu. Parsiyel kat yırtıklar, 22 (%70) hastada rim-rent şeklinde idi. Supraspinatus tendonunun tam kat yırtığı sadece yedi (%16) hastada mevcuttu. Subakromiyal ve subkorakoid bursit, sırasıyla 31 (%72) ve 14 (%32) hastada tanımlandı. Biseps tendon patolojisi üç (%7) hastada, labral patoloji ise sadece bir (%2) hastada izlendi.

Sonuç: Os akromiyale olgularında, rotator manşet yırtıklarının görülme oranı artmıştır. Çoğu rotator manşet yırtığı supraspinatus tendonu ile ilişkili bulunmuştur ve en sık yırtık tipi parsiyel kat şeklindedir. Biseps tendonu ve glenoid labrum ile ilişkili patolojilerin görülme oranında artış saptanmamıştır.

Anahtar kelimeler: *Manyetik rezonans görüntüleme, os akromiyale, rotator manşet*

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INTRODUCTION

The acromion arises from two or sometimes three distinct and separate centers of ossification called the pre-acromion, meso-acromion, and meta-acromion (1). These centers of ossification are usually united by 22–25 years of age. When these centers fail to unite, the ununited portion is called an os acromiale. The incidence of os acromiale is 8.2% in specimens and 2.7% when evaluating axial radiographs. The frequency of OA varies from the ethnic group studied. (1). Correct identification of an OA is more reliably achieved by identifying the coracoacromial ligament that has no clavicular insertion. In questionable cases, a ligament seen to insert on the anterior osseous structure identifies an unfused os and not the distal clavicle. (2).

The origin of this anomaly is not readily well understood, and two theories are now adducted to explain it. The genetic theory hypothesizes that a genetics-based multifactorial pattern leads to an anomalous development of the acromion's ossification process (3,4).The mechanic theory ascribes the cause of malunion to recurrent overload on acromion during development (5).

Regular acromion offers the attachment to different muscles and ligaments that play a primary role during shoulder movements. If the fragment is unstable or becomes unstable after a trauma, muscles like deltoid during flexion and abduction movements of the shoulder can mobilize downward the fragment creating subacromial impingement and related cuff pathology (6).

In literature, the relations between OA and rotator cuff (RC) pathology (bursitis and cuff tear) are not readily defined because most of the published researches use inadequate methods to study soft and bony tissue together: archeological studies, cadaver dissection and X-ray imaging (4,5).

Many authors underline the importance of recognizing OA (stable or unstable) before surgery because if it is not discovered or untreated can predispose to recurrence of pain or cuff tear pathology (5).

In our study, we aimed to evaluate the types of RC tears and accompanying additional soft tissue pathologies of the shoulder in OA cases.

MATERİAL AND METHODS

MRI exams of 1642 patients with a complaint of shoulder pain referred to orthopedia clinics at Kayseri Training and Research Hospital, archieved between January 2015-July 2017, were evaluated and patients with OA were selected for the study. All MRI exams were taken with 1.5 T scanner (GE Healthcare,Signa Excite, Milwaukee). The patient's age range was between 28 and 80 years (average 61 years). Patients with age of 24 years and below were not included in the study, because of false-positive result according to the physiological incompleted fusion.

Shoulder MRI exams were achieved with Axial Proton Density Weighted (PDW), Fat Saturation (Fat Sat) (TR:2100-2200/TE:40-45 msn, slice thickness: 3.5 mm, matrix: 256x256), Sagittal T2W Fast Spin Echo (FSE) Fat Sat (TR:3400-3500/TE:95-100 msn, slice thickness: 3.5 mm, matrix: 256x256), Coronal PDW Fat Sat (TR:2010-2020/TE:42-45 msn, slice thickness: 3.5 mm, matrix: 256x256) and Coronal T1W FSE (TR:600-620/TE:10-19 msn, slice thickness: 3.5 mm, matrix: 512x512).

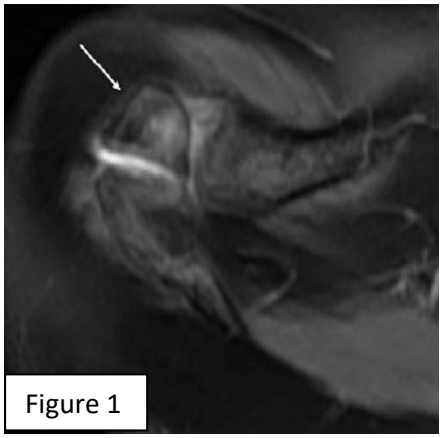
In all patients; RC tendons (infra-supraspinatus, teres minor, subscapularis), subacromiale-subcoracoid bursae, biceps tendon and glenoid labrum were evaluated. RC pathologies were described as tendinosis, no tear, partial thickness tear (PTT), and full thickness tear (FTT). PTTs were also interpreted as intrasubstance, articular (rim rent) or bursal sided tears. Bursitis was noted as absent or present. Biceps tendon pathologies were mentioned as tear, tendinosis or luxation. Labral pathology was noted as tear.

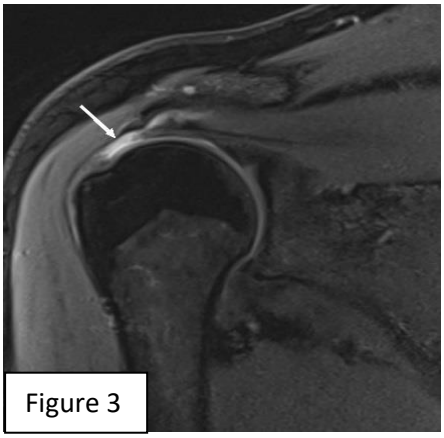
RESULTS

OA was found in 43 patients with an average age of 61 years (28-80) and the frequency was 2.6% (Figure 1). Thirty-five of patients (81.4%) were female, and eight (18,6%) were male. RC tear was found in 38 patients (88.3%). There was no tear in four patients, and tendinosis was present in one patient.

Tablo 1. Shoulder pathologies with OA were illustrated

	Supraspinatus tendon	İnfraspinatus tendon	Subscapularis tendon	Subacromial-subdeltoid bursa	Biceps tendon	Glenoid labrum
Partial thickness tear	31	2	1	-	2	-
Full-thickness tear	7	3	1	-	-	-
Tendinosis	3	-	-	-	-	-
Effusion	-	-	-	31	-	-
Dislocation	-	-	-	-	1	-
Avulsion	-	-	-	-	-	1





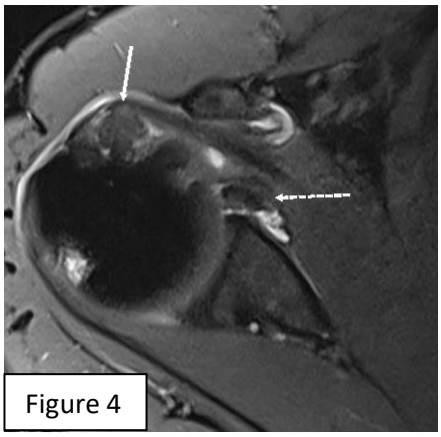


Figure 1: Axial PDW Fat Sat image shows os acromiale (arrow) as a separate bony fragment between the distal clavicula and acromion.

Figure 2: Sagittal T2W FSE Fat Sat image shows a rim-rent tear of supraspinatus tendon (arrow) in a female patient with os acromiale.

Figure 3: Full-thickness tear of supraspinatus tendon (arrow) and subacromial bursitis are seen at sagittal T2W FSE Fat Sat image in a female patient with os acromiale.

Figure 4: Axial PDW Fat Sat image shows ALPSA lesion of glenoid labrum (dashed arrow) and tendinosis of biceps tendon (solid arrow) in a patient with os acromiale.

PTT of supraspinatus (SS) tendon (Figure 2) was present in 31 (72%) patients and 25 of them were isolated, three with tendinosis of SS, one with intrasubstance tear of infraspinatus (IS) tendon, one with FTT of IS tendon, and one with FTT of subscapularis (SubS) tendon. Twenty-two (70%) of PTTs were as rim-rent tear, 8 (25%) were bursal-sided tear and one was intrasubstance tear in nature. FTT of SS tendon (Figure 3) was detected in seven (16%) patients which was seen isolated in four patients and two of them with FTT of IS tendon, and one with FTT of both IS and SubS tendons. Subacromial and subcoracoid bursitis were defined in 31 (72%) and 14 (32%) patients, respectively (Figure 3). RC tear was accompanied in all cases with bursitis. Biceps tendon pathology was seen in three (7%) cases as: split tear (n=1), split tear and tendinosis (n=1), and dislocation (n=1) (Figure 4). In the case of split tear, there was accompanying PTT of SS tendon and FTT of SubS tendon; in split tear and tendinosis case, PTT of SS tendon was accompanied; in the dislocation case, FTT tears of SS, IS and SubS tendons were evident. Labral pathology was seen only in one (2%) case and as Anterior Labroligamentous Periosteal Sleeve Avulsion (ALPSA) lesion (Figure 4). Shoulder pathologies with OA were illustrated in Table 1.

DISCUSSION

RC impingement commonly results from entrapment of the SS tendon between the humeral head and the anterior portion of the acromion, coracoacromial ligament, or acromioclavicular joint. Predisposing factors include subacromial osteophyte, hypertrophy of the acromioclavicular joint, thickening of the coracoacromial ligament, instability of the glenohumeral joint, and anatomic variations of the acromion (7,8).

Rovesta et al. evaluated shoulder MRIs and had found the frequency of OA as 3.44% without differences between sexes (5). In our study, the frequency of OA was found 2.6%, and 81.4% of patients were female. Jerosch et al. reported an OA incidence in patients with rotator cuff tears as 9.8% (9).

Sammarco et al. concluded that the incidence of OA in populations with RC tears was not markedly different from the incidence of OA in the general population (8%) (10), while Mudge et al. concluded that OA and RC tears were likely associated, and reported an incidence of OA in subjects with RC tears of 6 % (6).

It has been demonstrated that OA may predispose to RC impingement (11). The concept linking OA to RC tears suggested that the incidence of unfused acromial epiphyses would be greater in populations with RC tears (12). There are reports of an association of OA and impingement syndrome and RC tears. (1,6,11).

Ouellette et al. (12) examined the association of OA with SS and IS tears with using MRI in 42 cases, and compared with age- and gender-matched subjects with no evidence of OA. They found 27 SS tears and 17 IS tears in OA cases. The nature of SS and IS tears were being mostly as PTT, 12/42 and 8/42, respectively. They didn't found statistically significant difference between the OA and control groups, with regard to tears of the SS and IS tendons, and there was no statistically significant difference between OA and control group with regard to FTT, PTT or tendinopathy of the SS and IS tendons, and no difference in the location of RC tear between the two groups. In our study, SS tendon was affected in all patients with RC tear (88.3%) . The most tear pattern was defined as PTT in 31 (72%) patients with a dominance of rim-rent tear (70%). Isolated IS tendon tear was not present, and described in only four cases which were accompanying SS tendon tears. We also evaluated the biceps tendon and glenoid labrum pathologies that not mentioned before in literature. We have found only three cases with biceps tendon pathology and one case with labral pathology. There are also comparative studies of rotator cuff tears with and without OA cases. According to our opinion, with considering that cases with OA frequently shows rotator cuff pathologies in a chronic process and control group with no evidence of OA mostly have pathologies after acute traumatic injuries, comparing these two groups will not be meaningful.

CONCLUSION

There is an increased ratio of rotator cuff tears in OA cases. Most of the tears are seen within the SS tendon and tear patern is mostly PTT. Because of the nature of PTTs was mostly rim-rent, it may be considered meaningful since it may also indicate that OA causes impingement. There was no significant association between OA and pathologies of biceps tendon and glenoid labrum.

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