

# The Prevalence of Chronic Impingement Syndrome and SLAP Lesion and the Sensitivity of O'Brien's Test

## Kronik Impingement Sendromu ile Birlikte SLAP Lezyonunun Görülme Sıklığı ve O'Brien Testinin Duyarlılığı

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### Abstract

**Objective:** In this study, we aimed to investigate the prevalence of SLAP lesions in patients with chronic impingement syndrome. We also examined the sensitivity of O'Brien's test.

**Materials and Methods:** The study included 48 patients with a preliminary chronic impingement syndrome diagnosis to whom arthroscopic decompression had been planned. All patients underwent preoperative Neer's, Hawkins' and O'Brien's tests. We performed shoulder arthroscopy on all patients and evaluated chronic impingement syndrome and SLAP lesions. Then, we compared the statistical sensitivities of these tests.

**Results:** The mean age of patients with chronic impingement was 45.8 years (range, 35-69 years). O'Brien's test was positive in 34 (70.8%) of the patients, and Neer's test and Hawkins' test were positive in 46 (95.8%) of the patients before shoulder arthroscopy. Shoulder arthroscopy revealed that 44 (91.7%) of 48 patients had subacromial impingement; 32 (66.7%) had SLAP lesions and internal impingement. In chronic impingement syndrome, sensitivity rates were 95.6% for Neer's test and Hawkins' test, whereas in internal impingement syndrome and slap lesions, the sensitivity of O'Brien's test was 94.1%. There was no statistical difference between the tests ( $p>0.05$ ).

**Conclusion:** 72.72% of the patients with chronic impingement syndrome had concomitant SLAP lesions. We suggest that O'Brien's test should be used with Neer's and Hawkins' tests for diagnosis of this condition.

**Key Words:** Chronic impingement, Hawkins' test, Neer's test, O'Brien's test, SLAP lesion

### Özet

**Amaç:** Çalışmamızda kronik impingement sendromlu hastalar da SLAP lezyonu görülme sıklığını ve O'Brien testinin duyarlılığını araştırmayı amaçladık.

**Gereç ve Yöntem:** Artroskopik subakromiyal dekompresyon planlanan, kronik impingement sendromu ön tanısı olan 48 hastayı çalışmamıza aldık. Hastaları omuz artroskopisi öncesi Neer, Hawkins ve O'Brien testleri ile değerlendirdik. Daha sonra omuz artroskopisi yaparak, hastaları kronik impingement sendromu, internal impingement sendromu ve SLAP lezyonları açısından değerlendirdik. Bu testlerin duyarlılıklarını istatistiksel olarak karşılaştırdık.

**Bulgular:** Yaş ortalaması 45.8 yıl (dağılım 35-69 yıl) olan, omuz artroskopisi öncesi 46 (%95.8) hastada Neer ve Hawkins testleri, 34 (%70.8) hastada O'Brien testi pozitif. Omuz artroskopisinde 48 hastanın 44'ünde (%91.7) subakromiyal impingement, 32'sinde (%66.7) SLAP lezyonu ve internal impingement görüldü. Kronik impingement sendromunda; Neer ve Hawkins testleri %95.6 oranında duyarlı iken, internal impingement sendromu ve slap lezyonlarında O'Brien testi %94.1 oranında duyarlı idi ve testler arasında istatistiksel olarak fark görülmedi ( $p>0.05$ ).

**Sonuç:** Kronik impingement sendromlu hastalarda %72.72 oranında SLAP ve internal impingement lezyonu görülmekte, tanıda Neer ve Hawkins testleri ile beraber O'Brien testinin de yapılmasının gerektiğini düşünmekteyiz.

**Anahtar Kelimeler:** Kronik impingement, Hawkins testi, Neer testi, O'Brien testi, SLAP lezyonu

### Introduction

One of the common causes of shoulder pain is chronic impingement syndrome [1-4], which results from compression of the rotator cuff mechanism in between the acromion,

coracoacromial ligament, coracoid process and acromioclavicular joint during movements of the glenohumeral joint, especially during flexion and external rotation [5-8].

Chronic impingement syndrome should be evaluated for external and internal impingement [9, 10]. A comprehensive

**Received:** March 19, 2012 / **Accepted:** July 26, 2012

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doi:10.5152/eajm.2012.35

physical examination should be performed, and differential diagnoses should be kept in mind. Neer's and Hawkins' tests are known as the most specific tests for diagnosis [11]. However, O'Brien's test is an effective test for labral abnormalities and is also sensitive and specific for acromioclavicular joint abnormalities [12].

In this study, we investigated the frequency of SLAP lesions in patients with chronic impingement syndrome, and we aimed to compare the sensitivity of O'Brien's test to that of Neer's and Hawkins' tests. We conducted this study to show that performing O'Brien's test together with Neer's and Hawkins' tests for the diagnosis of subacromial impingement is important because of the high frequency of SLAP lesions in patients with chronic impingement syndrome.

### Materials and Methods

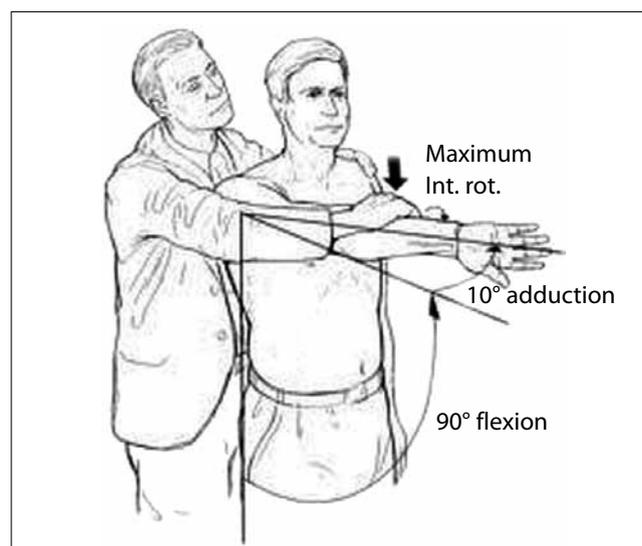
A total of 48 patients with chronic impingement syndrome were included in the study (mean age, 45.8 years; range 35-69). The study group consisted of 26 (54%) male and 22 (46%) female patients. All patients underwent Neer's, Hawkins' and O'Brien's tests prior to shoulder arthroscopy. Neer's test: Preventing scapular rotation with one hand, the arm of the patient is forced to elevate by the other hand at an angle between flexion and abduction. If pain is present, the test is positive. Hawkins' test: The arm of the patient is held at 90 degrees flexion and then forced to rotate internally. If pain is present, the test is positive. O'Brien's test: While the elbow is fully extended, the arm is flexed to 90 degrees and adducted 15 degrees closer to the midline. The patient is asked to maximally internally rotate so that the thumb is pointed downward. Then, the patient is asked to resist the downward force applied to the arm. If pain occurs during resistance and decreases after external rotation to the same position against downward force, the test is positive (Figure 1, 2) [12].

All patients had shoulder arthroscopy in a beach chair position under interscalene block anesthesia. The arthroscope is inserted into the shoulder joint and subacromial bursa to evaluate the presence of SLAP lesions. Arthroscopic subacromial decompression was performed. Osteophytes around the acromioclavicular joint and spurs on the inferior aspect of the acromion were removed, the subacromial bursa was excised and the coracoacromial ligament was transected at its insertion into the acromion.

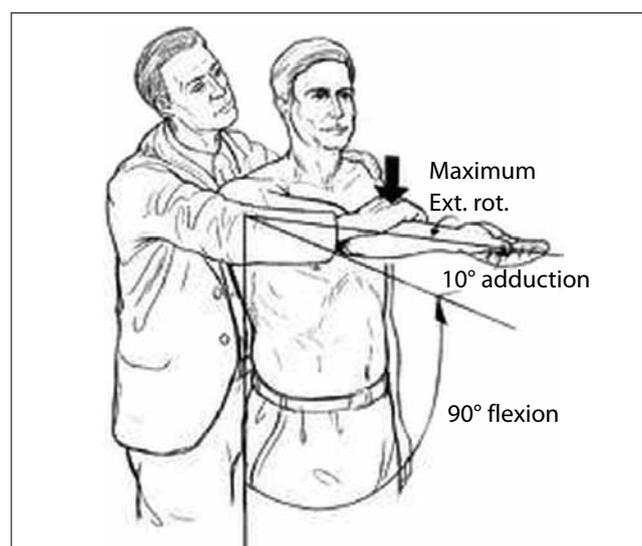
The results of the three tests were compared by statistical analysis. Descriptive statistics, frequency, percent values, means and standard deviations were used. Data were analyzed using the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 18.0. Normal distributions of variables were tested by Student's t-test. Statistical significance was set at  $p < 0.05$  with a 95% confidence interval.

### Results

Prior to arthroscopy, Neer's and Hawkins' tests were positive in 46 (95.8%) patients, whereas O'Brien's test was positive in 34 (70.8%) patients. Arthroscopy revealed that two (4.16%) patients had adhesive capsulitis, two (4.16%) patients had frozen shoulder and 44 (91.7%) patients had chronic impingement syndrome. In the study group, 32 (66.7%) of the patients with chronic impingement syndrome had SLAP



**Figure 1.** Patient's arm is flexed to 90 degrees, adducted to 10 degrees to 15 degrees, and maximal internal rotation is made. The patient is told to resist against a downward force.



**Figure 2.** Then the patient is told to maximally supinate the arm, and the maneuver is repeated.

**Table 1. Comparison of Neer's, Hawkins' and O'Brien's tests**

	Impingement Syndrome arthroscopy		SLAP lesion arthroscopy	Sensitivity	
	Preoperative	Preoperative	Preoperative		
Neer's test	46 (95.8%)	44 (91.7%)		*95.6%	
Hawkins' test	46 (95.8%)	44 (91.7%)		*95.6%	
O'Brien's test			34 (70.8%)	32 (66.7%)	*94.1%

N: 48, \*p>0.05; Comparison of tests sensitivities

lesion (Type 1 SLAP lesion, 15 (46.87%); Type 2 SLAP lesion, 13 (40.62%); Type 3 SLAP lesion, two (6.25%); Type 4 SLAP lesion, two (6.25%) (According to the Snyder classification of SLAP lesions)). The sensitivity rate for Neer's and Hawkins' tests were 95.6%, whereas sensitivity of O'Brien's test was 94.1%. A comparison of these three tests did not show a significant difference ( $p>0.05$ ) (Table 1). The SLAP lesion rate was 72.72% in patients with chronic impingement syndrome. No postoperative complications were observed.

## Discussion

The most common symptom of chronic impingement syndrome is pain and mostly it is located at the anterior part of shoulder. Neer [13], first described the situation in 1972. Neer divides chronic impingement syndrome into two groups: external and internal. Acromioclavicular joint pathologies, osteophytes, acute or chronic bursa inflammation, thickness of the coracoacromial ligament, proximal humeral fracture and structural changes in the acromion (especially type 3 hook acromion) are among the extrinsic compression causes. Primary intrinsic degeneration of rotator cuff tendons, SLAP lesions, labral tears, anterior laxity and instability of the shoulder, posterior capsular contractures and pathologies of the humeral head and glenoid bone are among the causes of internal impingement.

In the diagnosis of chronic impingement syndrome, Neer's and Hawkins' tests are known as the most sensitive tests [12]. Neer's test used for chronic impingement syndrome generally gives negative result in athletes with internal impingement [14].

Degeneration of the labrocapsular complex to various degrees at the superior labrum and anterior and posterior attachment points is called a SLAP lesion [15]. O'Brien's test is a specific test for a SLAP lesion [12]. O'Brien [12] stated that the sensitivity and specificity of this test in labral abnormalities are 100% and 98.5%, respectively. Walch et al. [16]

reported that the SLAP lesion rate was 71% in 17 patients with internal impingement. McFarland et al. [17] found that the sensitivity and specificity of O'Brien's test in SLAP lesions were 47% and 54%, respectively. Parentis et al. [18] reported that the sensitivity of O'Brien's test was 64% in SLAP lesions. Paley et al. [19] performed arthroscopy in 41 athletes with internal impingement and found posterosuperior abrasion in 84% of them. Fowler [20] evaluated shoulder tests in 101 athletes and found that the sensitivity of O'Brien's test was 64% in the diagnosis of SLAP lesions, and the general accuracy was 54%. He also identified SLAP 2 or SLAP 3 lesions in 51 (50.4%) patients.

In our study, the SLAP lesion rate was 72.72% in patients with chronic impingement syndrome. The sensitivity of O'Brien's test was 94.1%, whereas the sensitivity of Neer's and Hawkins' tests was 95.6%. There was no statistically significant difference among these tests. Presence of SLAP lesions concomitant with chronic impingement syndrome is quite high. We suggest that performing O'Brien's test together with Neer's and Hawkins' tests in patients with chronic impingement syndrome is crucial for identifying SLAP lesions.

**Conflict of interest statement:** The authors declare that they have no conflict of interest to the publication of this article.

## References

1. Lim KK, Chang HC, Tan JL, Chan BK. Arthroscopic subacromial decompression for stage-II impingement. *J Orthop Surg (Hong Kong)* 2007; 15: 197-200.
2. Atalar AC, Demirhan M, Kocabey Y, Akalin Y. Arthroscopic subacromial decompression: one- to seven-year results. *Acta Orthop Traumatol Turc* 2001; 35: 377-81.
3. Ozcan A, Tulum Z, Bacakoğlu AK. The relationship between quality of life and functional status measurements in shoulder impingement syndrome. *Acta Orthop Traumatol Turc* 2003; 37: 219-25.
4. Celik D, Sirmen B, Demirhan M. The relationship of muscle strength and pain in subacromial impingement syndrome. *Acta Orthop Traumatol Turc* 2011; 45: 79-84. [ ]
5. Petterson G. Rupture of the tendon aponeurosis of the shoulder joint in antero-inferior dislocation. *Acta C Scand* 1942; 77: 1-187.
6. Beach WR, Caspari RB. Arthroscopic management of rotator cuff disease. *Orthopedics* 1993; 16: 1007-15.
7. Bigliani LU, Levine WN. Current concepts review. Subacromial impingement syndrome. *J Bone Joint Surg* 1997; 79: 1854-68.
8. Neer CS. Anterior acromioplasty for the chronic impingement syndrome in the shoulder. *J Bone Joint Surg* 1972; 54: 41-50.
9. Akman S, Küçükkaya M. Subacromial impingement syndrome: pathogenesis, clinical features, and examination methods. *Acta Orthop Traumatol Turc* 2003; 37: 27-34.
10. Cakmak A. Conservative treatment of subacromial impingement syndrome. *Acta Orthop Traumatol Turc* 2003; 37: 112-8.
11. Magee DJ. *Orthopedic Physical Assessment*. W.B. Saunders Company-Philadelphia, Fourth Edition. Chap 2002; 5: 207-319.

12. O'Brien SJ, Pagnani MJ, Fealy S, McGlynn SR, Wilson JB. The active compression test: a new and effective test for diagnosing labral tears and acromioclavicular joint abnormality. *Am J Sports Med* 1998; 26: 610-3.
13. Neer CS. Impingement lesions. *Clin Orthop Relat Res* 1983; 173: 70-7.
14. Behrens SB, Compas J, Deren ME, Drakos M. Internal impingement: a review on a common cause of shoulder pain in throwers. *Phys Sports Med* 2010; 38: 11-8. [\[CrossRef\]](#)
15. Snyder SJ, Karzel RP, Pizzo WD, Ferkel RD, Friedman MJ. Arthroscopy classics. SLAP lesions of the shoulder. *Arthroscopy* 2010; 26: 1117. [\[CrossRef\]](#)
16. Walch G, Boileau P, Noel E, Donell ST. Impingement of the deep surface of the supraspinatus tendon on the posterosuperior glenoid rim: An arthroscopic study. *J Shoulder Elbow Surg* 1992; 1: 238-45. [\[CrossRef\]](#)
17. McFarland EG, Kim TK, Savino RM. Clinical assessment of three common tests for superior labral anterior-posterior lesions. *Am J Sports Med* 2002; 30: 810-5.
18. Parentis MA, Glousman RE, Mohr KS, Yocum LA. An evaluation of the provocative tests for superior labral anterior posterior lesions. *Am J Sports Med* 2006; 34: 265-8. [\[CrossRef\]](#)
19. Paley KJ, Jobe FW, Pink MM, Kvitne RS, ElAttrache NS. Arthroscopic findings in the overhand throwing athlete: evidence for posterior internal impingement of the rotator cuff. *Arthroscopy* 2000; 16: 35-40. [\[CrossRef\]](#)
20. Fowler EM, Horsley IG, Rolf CG. Clinical and arthroscopic findings in recreationally active patients. *Sports Med Arthrosc Rehabil Ther Technol* 2010; 15; 2. [\[CrossRef\]](#)