[Orthopaedic Surgery]

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Superior Labral Anterior-Posterior (SLAP) Tears in the Military: A Clinical Review of Incidence, Diagnosis, and Treatment Compared With the Civilian Population

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Context: Given the notable physical demands placed on active members of the military, comprehension of recent trends in management and outcomes of superior labral anterior-posterior (SLAP) tears in this patient population is critical for successful treatment.

Evidence Acquisition: Electronic databases, including PubMed, MEDLINE, and Embase, were reviewed for the years 1985 through 2016.

Study Design: Database review.

Level of Evidence: Level 5.

Results: Active members of the military are at increased risk of sustaining shoulder injuries, particularly SLAP tears. Recent trends in management of SLAP lesions have shifted toward operative intervention. In the correct patient population, repairs of superior labrum tears demonstrate improved function and pain. Surgical repair of SLAP tears, especially in young and active military personnel, is supported.

Conclusion: Military personnel are at greater risk of suffering a SLAP tear in comparison with their civilian counterparts. Surgical repair of these lesions is advocated in this subpopulation when the patient is younger than approximately 36 years of age, and if older, biceps tenodesis is likely superior.

Keywords: SLAP tear; shoulder instability; military

The superior labrum and biceps anchor improve joint stability by acting as a secondary stabilizer to the shoulder.[2,12] Injury to this complex often involves tears of the superior aspect of the glenoid labrum in overhead throwing athletes.[2]

Overhead athletes may be at increased risk of anterosuperior labral tearing due to the excessive forces imparted by the biceps tendon, particularly during the followthrough phase of throwing.[2] These superior labral tears were later classified into 4 distinct subtypes that comprise today's commonly utilized classification scheme (Figure 1). Common to each subtype is the anterior to posterior involvement of the superior labrum, giving rise to the universally accepted term, superior labral anterior-posterior (SLAP) tears.

Recently, SLAP tears have been recognized as a significant cause of shoulder pain and disability. These lesions often affect the athlete participating in overhead sports (eg, baseball, tennis, volleyball). More recently, the active-duty military population has been identified as another at-risk population for SLAP tears given the greater incidence of these injuries compared with civilians.[10,15] The high physical demands of active military

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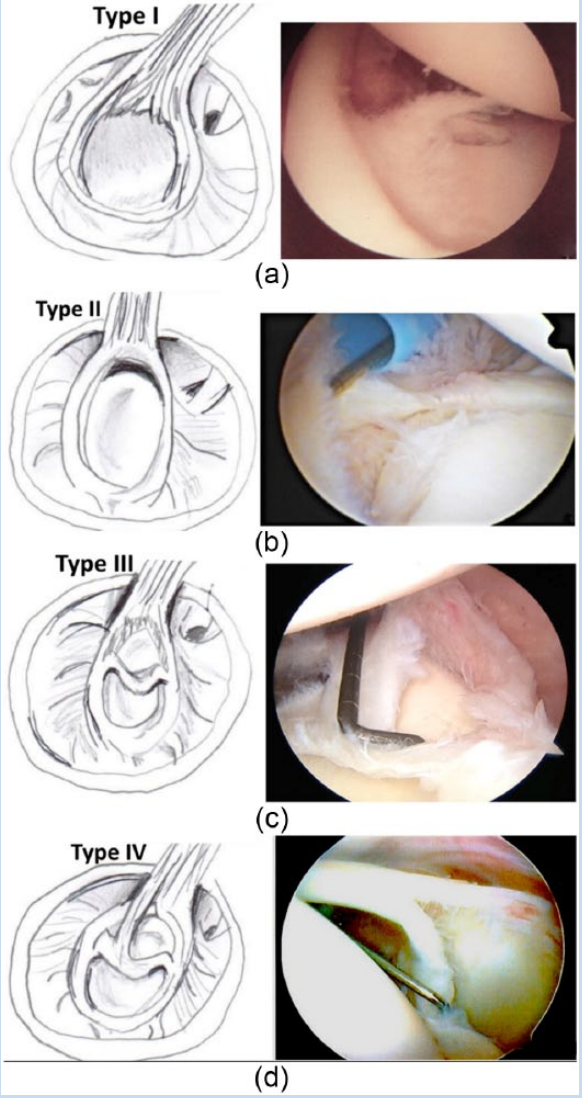

Figure 1. There are several types of superior labral anterior-posterior (SLAP) tears that have been described. These are the most common patterns: (a) type I, fraying but with no frank tear of the articulating surface of the superior portion of the glenoid labrum and with an intact biceps tendon; (b) type II, superior labral fraying with stripping of the superior part of the labrum and attached biceps tendon from the underlying glenoid cartilage; (c) type III, bucket-handle tear of the superior portion of the labrum with the central portion of the tear often displaced into the joint and the peripheral portion firmly attached to the glenoid cartilage; and (d) type IV, bucket-handle tear of the superior portion of the labrum similar to the type III lesion, but with the tear extending into the biceps tendon.

personnel require daily push-ups, pull-ups, lifting of heavy deployment items, and combat readiness drills that leave this population prone to shoulder injuries.

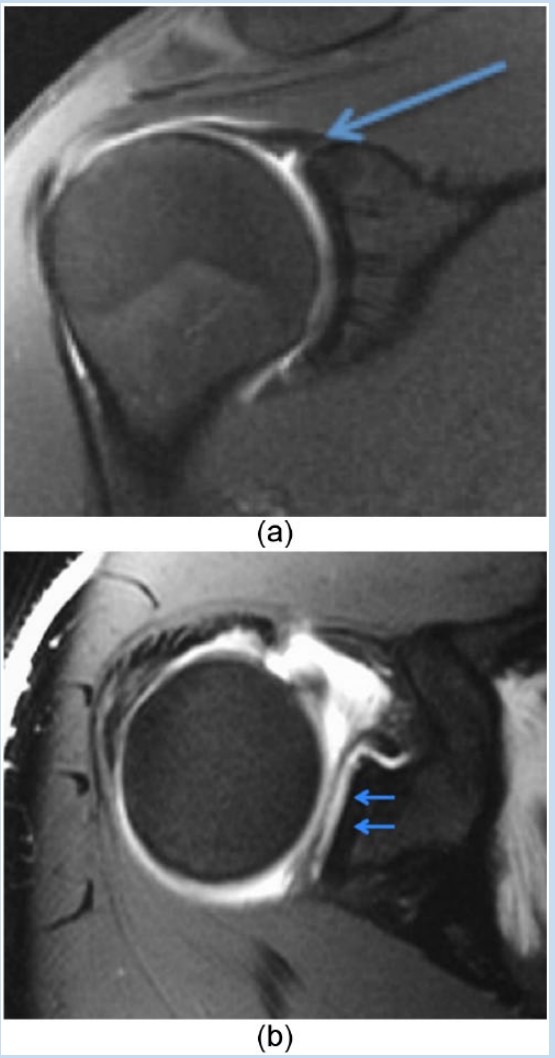

Figure 2. (a) Magnetic resonance arthrogram (MRA) in coronal view demonstrating a superior labral anterior-posterior (SLAP) tear (blue arrow) with dye extending superiorly and laterally. (b) Axial MRA in same patient demonstrating the superior aspect of the SLAP tear (blue arrows) with dye extending anterior to posterior from approximately 11 o'clock (anterior) to 2 o'clock (posterior).

A comparison of the incidence of SLAP lesions between the military and civilian populations demonstrated a significantly greater rate of these injuries among military patients: 38.6% versus 11.1%, respectively.[10] This increased injury risk, coupled with the need for a reliable and predictable outcome in a very high-demand patient population, has led to an increasing number of patients being treated surgically. This review focuses on the management and outcomes of these lesions in the active military population compared with the civilian population. Members of the Armed Forces represent a unique patient population that necessitates a thorough understanding of the injury to optimize their safe return to active duty.

MANAGEMENT

Prior to management, proper diagnosis and evaluation of the SLAP tear via magnetic resonance arthrography is absolutely necessary (Figure 2). Although recent reports have noted increasing incidence of surgically treated SLAP tears,[14,15,19] it is still common for nonoperative treatment to be considered prior to any surgical intervention. The goals of nonoperative treatment are improvement in shoulder range of motion through posterior capsular flexibility and strengthening of the rotator cuff and scapular stabilizing musculature.

Reports on the success of nonoperative treatment typically involve overhead throwing athletes or recreational athletes exposed to repetitive overhead activities. No previous reports look at the outcomes of nonoperative treatment in active military personnel. Although chronic injuries caused by tight posterior capsules may occur, the workload undertaken by active military personnel results in risk of an acute traction injury leading to a SLAP tear. In this instance, it is crucial to understand the pathoanatomy of the lesion and interpret the success of posterior capsular stretching with caution due to potential lack of applicability in active military personnel.

OUTCOMES

Recent outcomes studies of surgical repair of SLAP tears have shown significant improvements in validated outcomes scores among nonmilitary patients. Ide et al[9] reported 90% good to excellent results in overhead athletes, and Samani et al[17] demonstrated good results in 25 athletes. Friel et al[8] reported 89% patient satisfaction after arthroscopic SLAP repair. Factors that have been associated with poor outcomes in the civilian population have also been identified, and include age,[11,15] workers' compensation cases,[4] concomitant rotator cuff repair,[1,7] and status of throwing athlete.[13] Pain and stiffness are the 2 most common complaints after failure of an arthroscopic SLAP repair.[11]

The unique high–physical demand lifestyle of a military population puts these individuals at increased risk of sustaining SLAP tears. Unfortunately, there are limited and conflicting studies that look at outcomes of surgical treatment in this population. Enad et al[6] specifically looked at 27 SLAP repairs in a military population and found that 96% of patients were back to full duty at final follow-up and 87% of patients with isolated SLAP tears had good to excellent results.

In contrast to these findings, Provencher et al[15] looked at a larger series of 179 active military personnel who underwent surgical repair of type II SLAP tears. Although it was demonstrated that arthroscopic SLAP repairs provide statistically significant improvements in treatment outcomes, they reported a surprisingly high failure rate of 37% and a revision rate of 28%. Younger patients (<36 years) were found to have higher outcome scores and greater levels of function throughout the follow-up period. A total of 77% of failures in this cohort were younger than 36 years, thus leading to their conclusion that active military personnel younger than 36 years were more likely to benefit from arthroscopic SLAP repair than those older than 36 years.

These findings are consistent with those of Boileau et al,[3] who suggested that biceps tenodesis in the older throwing athlete yielded superior results compared with repair of type II SLAP lesions when they reported an 87% return to play after tenodesis compared with 20% return to play after repair. Although an active military population differs from overhead athletes, the dependence on a reliable, painless arc of shoulder motion accompanied by prolonged, extreme mechanical forces across the glenohumeral joint is equally crucial in each. This similarity allows for comparisons regarding surgical outcomes in these 2 high-demand patient populations. Although more high-powered studies are necessary, the combined analyses of Boileau et al[3] and Provencher et al[15] suggest that active military personnel younger than 36 years would most benefit from an arthroscopic repair, while those older than 36 years benefit most from tenodesis. These recommendations are supported by Ek et al,[5] who reported comparable results between civilian patients undergoing SLAP repair (age <35 years) and those undergoing biceps tenodesis (age >35 years).

SUMMARY

The high-demand lifestyle of the active military population places these patients at increased risk of superior labral tears. As SLAP tears are known to cause significant pain and dysfunction, it is imperative to know how to best advise these patients regarding their management options and likelihood of returning to active duty. Given that the biceps anchor may act as a secondary stabilizer of the shoulder,[16,18] surgical repair of these lesions, especially in young patients (<36 years), is supported.[5,15] Further work is necessary to determine the optimal treatment of older members of the armed forces with SLAP lesions.

Clinical Recommendations

SORT: Strength of Recommendation Taxonomy Grade
A: consistent, good-quality patient-oriented evidence
B: inconsistent or limited-quality patient-oriented evidence
C: consensus, disease-oriented evidence, usual practice, expert opinion, or case series

Clinical Recommendation	SORT Evidence Rating
Surgical management for the treatment of SLAP tears in an active military population has been reliably shown to significantly improve functional outcome scores.	A
Surgical fixation of SLAP tears in an active military population is associated with a high failure rate.	B
Active military personnel younger than 36 years of age with SLAP tears are best treated with SLAP repairs.	A
Active military personnel older than 36 years of age with SLAP tears may be best managed with a biceps tenodesis.	B

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