The Incidence and Demographics of Shoulder Repair in Wisconsin, 2002-2010

Robert H. Ablove, MD; Allison Aul, BS; Geoffrey Baer, MD, PhD

ABSTRACT

Importance: Recent evidence has demonstrated a profound increase in the incidence of shoulder surgery. Superior labral anterior and posterior (SLAP) repair is a common procedure that has been noted in other studies to be increasing.

Objective: The purpose of this study is to report the incidence and demographics of a single shoulder surgery code in the state of Wisconsin in order to evaluate whether it is being performed in increasing numbers relative to population.

Methods: In a retrospective review of the Wisconsin Hospital Association statewide database for the years 2002-2010, we queried one ICD-9 procedure code: 81.83, other repair of shoulder (not replacement or repair of recurrent dislocation). This code was selected because it would include SLAP repair and exclude most other common shoulder surgeries. The data retrieved includes ICD-9 diagnosis codes, county of surgery, patient age, and gender.

Results: The number of surgeries performed in Wisconsin over the course of the study increased by 91.4% between 2002 and 2010, starting at 5649 in 2002 and rising to 10,812 by 2010. The incidence of surgeries increased 83.1% over this time period: from 103.8 per 100,000 in 2002 to 190.1 per 100,000 in 2010. The ratio of male to female surgeries remained nearly constant at 3:2 throughout the length of the study. The mean patient age at time of surgery increased 2.6 years, from 48.3 in 2002 to 50.9 in 2010.

Conclusions: The increase in number of shoulder surgeries is well beyond expectations based on population growth. The relatively high percentage of females does not correspond with reported gender ratios in other studies of similar shoulder procedures. The high mean age of patients and the large number of surgeries in older patients also is concerning. More educational effort needs to be given regarding the diagnosis and treatment of common shoulder conditions.

INTRODUCTION

Several studies have demonstrated an increase in the frequency of common shoulder surgical procedures.[1-3] Superior labrum anterior and posterior (SLAP) repair is a prominent example.[2,3]

SLAP tears involve an injury to the glenoid labrum. The glenoid labrum is a ring of fibrous and fibrocartilaginous tissue that encircles the glenoid cavity. Since the head of the humerus and the glenoid cavity differ in size, the labrum serves to increase the area of articulation and deepen the glenoid fossa, both of which increase joint stability. The labrum is also the site of attachment of the tendon of the long head of the biceps brachii muscle and the glenohumeral ligaments.[4] In 1985, Andrews et al described lesions of the glenoid labrum, mostly in the anterosuperior portion, identified in a group of throwing athletes.[5] In 1990, Synder et al introduced the term SLAP for lesions involving the superior portion of the glenoid labrum, which cause shoulder pain and instability.[6] The mechanism of injury is either axial loading or axial distraction of the arm causing labral tearing.

The reported incidence of SLAP lesions in shoulder arthroscopies has varied in different reports, ranging from 1.2% to 11.8%.[7-9] One possible explanation for this variation is controversy over what constitutes a SLAP tear.[10,11] Many variants occur in normal labral anatomy[4,12,13] and SLAP tears can be difficult to diagnose, even arthroscopically. No reliable diagnostic physical examinations are considered sufficient for diagnosis, and magnetic resonance imaging (MRI) techniques are able to identify only certain types of labral tears or associated pathology.[14]

Treatment is controversial. While most surgeons are able to come to agreement over treatment options for patients with both SLAP lesions and biceps pathology, appropriate treatment of other types of lesions without obvious biceps pathology or degenerative labral changes is not clear.[14] When the long head of the biceps is pathologic, SLAP tears can be addressed by either transfixing the biceps tendon in place (tenodesis) or transection (tenotomy). Due to these factors, it appears that SLAP tears often are overdiagnosed and fixed unnecessarily. Most reported SLAP repairs

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Author Affiliations: University at Buffalo Department of Orthopaedics and Sports Medicine, Buffalo, NY (Ablove); University of Wisconsin School of Medicine and Public Health, Madison, Wis (Aul, Baer).

Corresponding Author: Robert H. Ablove, MD, Erie County Medical Center, 462 Grider St, Buffalo, NY 14215; phone 716.898.3457, fax 716.898.5743, e-mail ablove@buffalo.edu.

occur in younger predominantly male patients. Arthroscopic SLAP repairs seem to be increasingly common, which is concerning given the above factors and uncertainty regarding appropriate indications for and benefits of the surgery.

The purpose of this study is to analyze the incidence and demographics of this code in the state of Wisconsin in order to evaluate whether the incidence is increasing relative to state population.

METHODS

This study was carried out using information from the Wisconsin Hospital Association (WHA) statewide database for the years 2002-2010. WHA collects both inpatient and outpatient data from all surgical centers in the state of Wisconsin. The data includes International Classification of Diseases revision 9 (ICD-9) procedure and diagnosis code, county of surgery, and patient age and gender. Because it is a public database and the data is de-identified, the study is exempt from review by the institutional review board.

We identified one ICD-9 procedure code: 81.83, other repair of shoulder (not replacement or repair of recurrent dislocation). This code was selected because it would include superior labrum anterior and SLAP repair—a common procedure that has been noted in other studies to be increasing—but excludes most other common shoulder procedures, including repair of dislocation, arthroplasty, rotator cuff repair, labral repair for dislocation, acromioplasty, biopsy, and synovectomy, as well as biceps tenotomy and tenodesis. Inclusion criteria for the study included any patient who had this code submitted as a principal or secondary procedure. Patients were limited to facilities in the state of Wisconsin, excluding VA hospitals. Within each year's data set, the numbers of male and female surgeries and patient age were noted.

The population information for the state of Wisconsin during the 2002-2010 period was taken from the US Census Bureau. Statistics were reported on procedure volumes, incidence rates, and demographic variables. Pearson correlation coefficient squared (R-squared values) were determined between selected variables (rate, age, gender, and diagnosis code) and time. A value of 1.0 means that 100% of the variability in the given variable can be explained by time. *P*-values were determined for the association between each value and time.

RESULTS

The number of procedures performed each year in the state of Wisconsin increased by 91.4% (*P*-value <0.001) between 2002 and 2010, starting at 5649 in 2002 and rising to 10,812 by 2010. On the basis of the population of the state of Wisconsin, the incidence of procedures increased 83.1% (*P*-value <0.001) over this time period: from 103.8 per 100,000 in 2002 to 190.1 per 100,000 in 2010 (Figure 1).

The ratio of male to female surgeries remained nearly constant at 3:2 throughout the length of the study (*P*-value 0.491) (Figure 2). The mean patient age at time of procedure increased 2.6 years (5.4%) (*P*-value <0.001), from 48.3 in 2002 to 50.9 in 2010 (Figure 3). This difference was not statistically significant (Figure 4).

An audit of our own institution demonstrated high correlation between current procedural terminology (CPT) codes for SLAP repair and this ICD-9 procedure code.

DISCUSSION

The purpose of this study is to evaluate the incidence and demographics of shoulder surgery in Wisconsin from 2002 through 2010. We postulated the rate was increasing. We sought to gather more data regarding the patients receiving shoulder surgery in order to determine how the gender ratio and age of patients compared to other studies.

The incidence of this surgery almost doubled during the course of the study. The male to female ratio was initially 3:2 and remained fairly consistent. The mean patient age increased from 48.3 to 50.9. The female patients were slightly older than male patients.

The ICD-9 procedure code 81.83 is designated for other repair of shoulder, not including arthroplasty, repair of dislocation, biceps tenodesis, and biceps tenotomy and should include all SLAP repairs and exclude most other common shoulder procedures. There has been very little change in the observed incidence of SLAP lesions, and the reported rate of SLAP surgeries as a percentage of overall surgeries has remained fairly low. Snyder et al reported rates of SLAP lesions of 6% of symptomatic shoulders noted at the time of arthroscopy.[8] Weber et al reported on the incidence rates, complications, and outcomes in orthopedic Part II board candidates.[3] In a 6-month surgical reporting period, Part II board candidates (orthopedic surgeons who have passed the Part I written board certification examination and sit for a practice-based oral examination) noted that SLAP repairs represented 9.4% of all reported shoulder surgeries. Of the SLAP repairs reported by Part II candidates, 78.4% were in males and 21.6% were in females with average ages of 36.4 for males and 40.9 for females.[3]

The results of this study are worrisome. The number of shoulder repairs relative to population was very high at the beginning of the study and nearly doubled by the end. The high percentage of females does not correspond with gender ratios in any other similar shoulder studies.[3,6,8,15] The average ages of both men and women were much higher than any other report.[2,3,6,8,15-17] Even if every case reported under this code was not a SLAP repair, there is no evidence supporting the numerical growth of any type of shoulder surgical repair over the course of this study. SLAP repair is not benign and carries a risk for complications, including stiff-

Figure 1. Number of Surgeries per 100,000 Patients

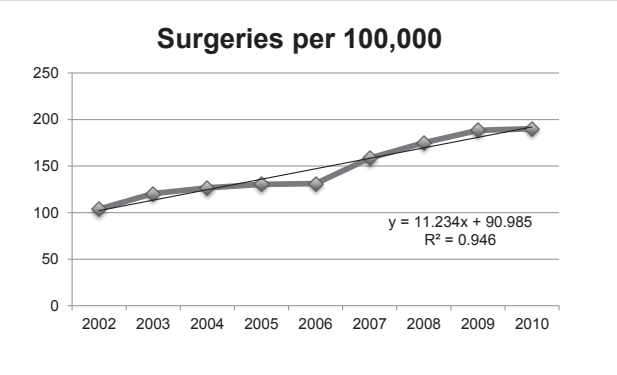


Figure 2. Male to Female Ratio (y-axis) vs Year (x-axis)

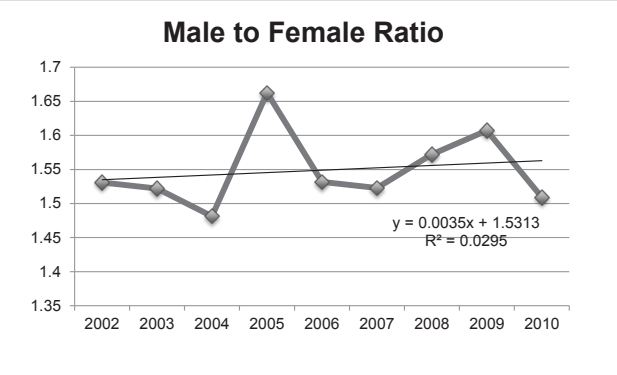


Figure 3. Patient Age (y-axis) vs Year (x-axis)

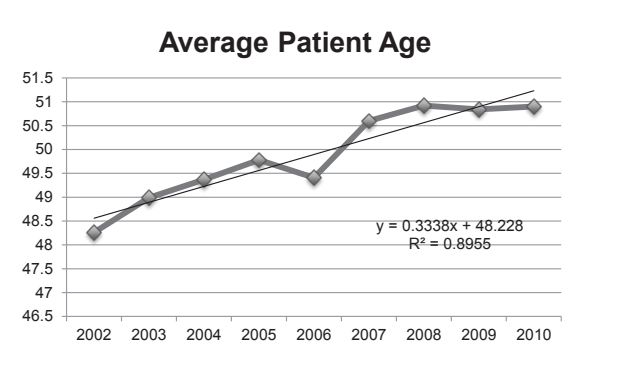
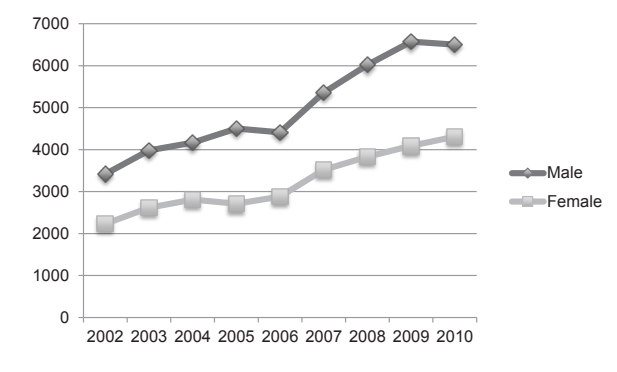


Figure 4. Number of Procedures (y-axis) vs Year (x-axis)



ness, rotator cuff tears next to arthroscopic portals, and articular cartilage damage.[3]

An obvious limitation of this study is the use of ICD-9 procedure codes, which are less specific than CPT codes, and the lack of more specific patient information. We are unable to report clinical outcomes or complication rates. We do not know how accurate the codes were and to what extent possible miscoding affected the results. Unfortunately, the only reason the information was available was due to the lack of specific patient identifiers. However, prior studies have demonstrated fairly high accuracy for coding of primary diagnosis and procedures using ICD-9 procedure codes.[18,19]

This data reinforces and emphasizes the findings of Weber et al. It is likely that SLAP tears are over-diagnosed and almost certain that too many SLAP repairs are being performed, particularly in older patients and, potentially in this study, in women. MRI findings of SLAP pathology should be viewed with circumspection and need to be correlated with clinical findings. There is still a need for better, more specific physical tests to confirm symptomatic SLAP pathology and treatment needs to reflect the age and needs of the patient. It also illustrates the need to evaluate the incidence of other common shoulder procedures. Educational efforts in both residency and fellowship need to be directed towards understanding indications for this and other procedures.

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