

Abstract

Context/ background: There are many injuries that a volleyball player may encounter in their career, whether it is in their lower extremity or even up in the upper extremity. A common injury you will find with these overhead athletes are SLAP tears. SLAP tears are historically found in baseball and softball players, but can also be found in Volleyball players as well. The terminology SLAP refers to, superior labrum anterior to posterior. This is when the head of the humerus wears down the labral aspect of the glenoid fossa from anterior to posterior. This is due to repetitive overhead activity which causes pain and discomfort within the athlete, leading to additional injuries due to compensation. Even though there are a lot of current literature that discuss about SLAP tears, their clinical diagnosis continuously varies for a number of reasons. Luckily, the rehabilitation protocols for this type of injury are constantly being utilized and adjusted in order to adequately treat the patients that have this injury. Additionally, A SLAP tear can lead to injuries within the bicep tendon. There has been a lot of research that discusses the rehabilitation of the bicep tendon that can be helpful and sometimes necessary.

Objective: The purpose of this case study was to use a volleyball athlete over at Florida Southwestern State College that has suffered a SLAP tear and take her through this rehabilitation process. The athlete was a first-year freshman that suffered a SLAP tear during her preseason training. A non-surgery approach was taking in treating her condition. We had this athlete in a two-week rehabilitation program in order to treat this condition.

Results: This results after this two-week rehab program showed a positive outcome on the athlete. She was able to go back to playing fully without any problems. The athlete had no further complications with her injured shoulder throughout the season.

Introduction

A SLAP tear can occur through many different ways. It can occur from an acute trauma where the head of the humerus gets shifted quickly and grinds on the labrum which can cause the labrum to tear. SLAP tears can also occur from repetitive overhead activity. The mechanics of an overhead throw or activity is what causes for the head of the humerus to grind on the labrum in the glenoid fossa resulting in a tear of the labrum. These types of tears are grouped into four categories. A type 1 SLAP tear involves the fraying of the top of the labrum but the labrum is still attached to the glenoid fossa. A type 2 SLAP tear is the most common out of the four characterizations of SLAP tears. A type 2 tear is categorized by labral and biceps tendon detachment from the glenoid. This is why a SLAP tear can lead to other injuries related to the bicep muscle group. A type 3 tear is known as a bucket-handle tear where the torn labrum can drop into the shoulder joint. The last type of SLAP tear is also considered a bucket-handle tear but it's located at the top of the labrum and extends into the biceps tendon to varying degrees. The athletes who are more susceptible to these types of injuries are overhead athletes or athletes that participate in contact sports. These athletes can come from baseball, volleyball, football, and other similar sports. It has been observed that baseball was the sport that this injury was most common, but now there is research that shows other sports where this injury is starting to become more prevalent. This literature review will focus on up to date rehabilitation exercises that are considered effective within volleyball players.

Case Report

Patient: This junior college volleyball player is a 20 year-old female athlete that suffered a grade 1 SLAP tear during her preseason training. The following information will explain the mechanism of injury, clinical assessments, radiographic findings, diagnosis, treatments and return to play to provide additional information to this athlete's unique injury.

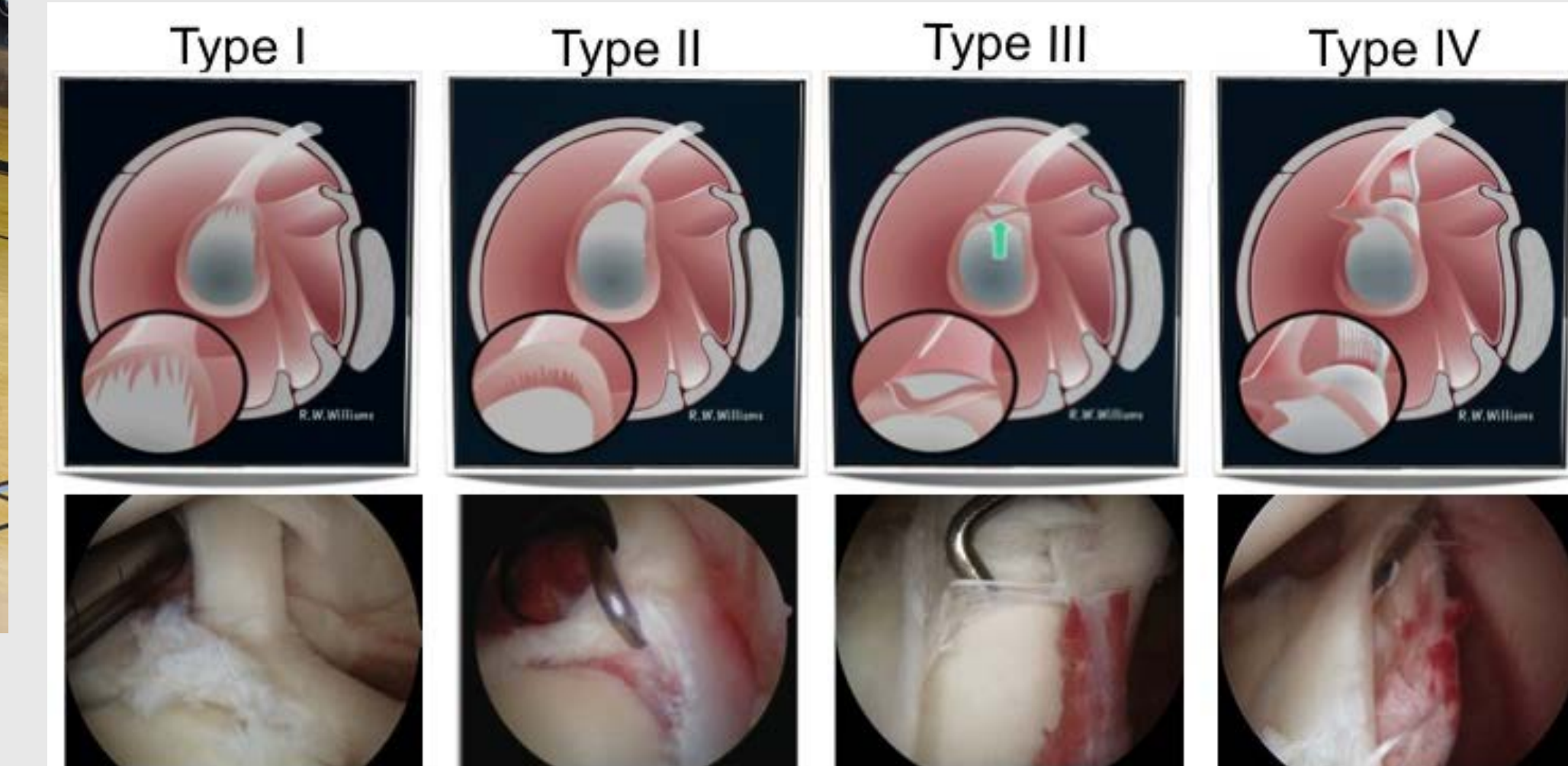
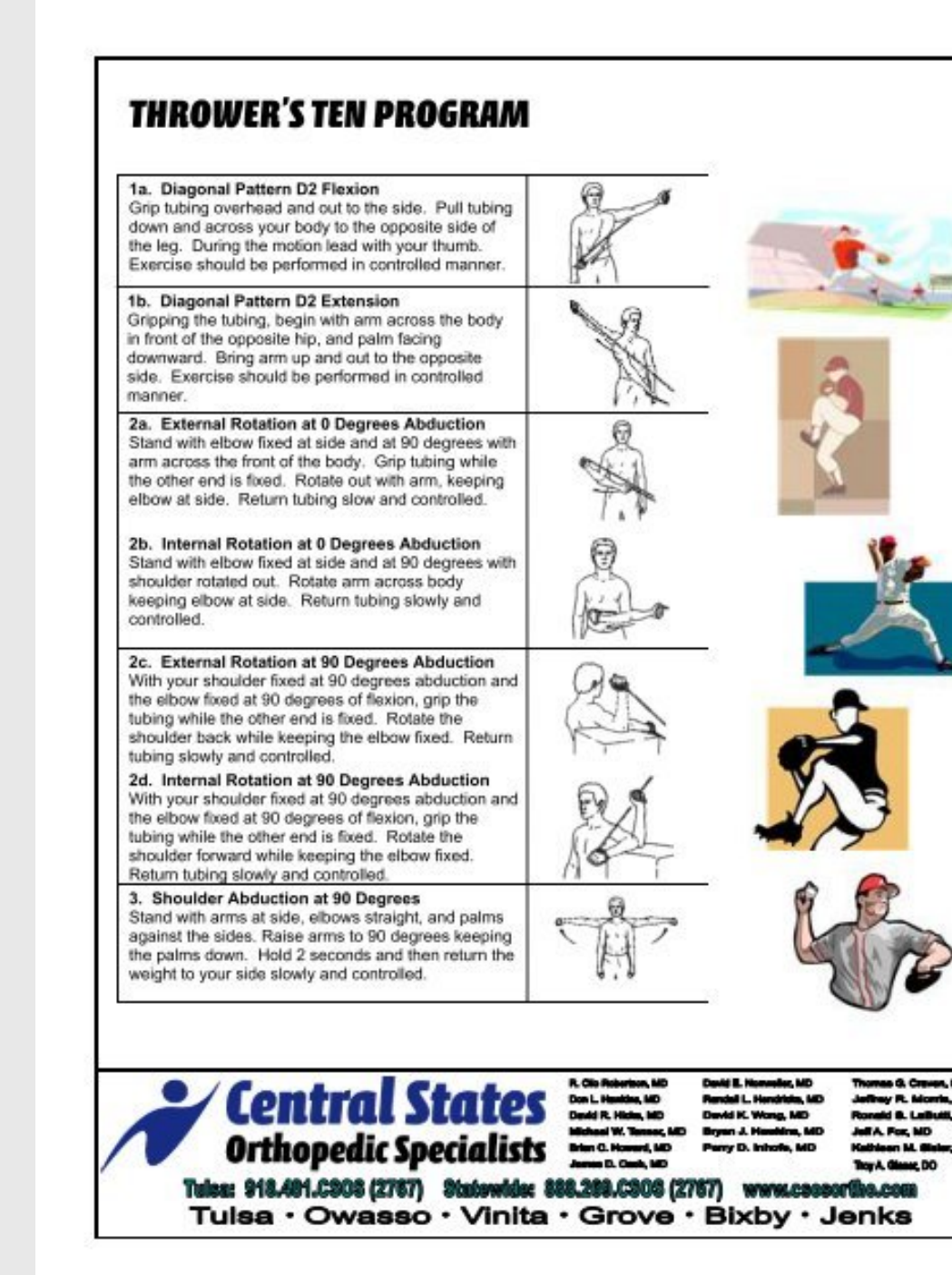
Mechanism of Injury: Familiari (2019) states, "SLAP tears are more commonly created when the shoulder is forward flexed compared with when it is in an extended position." Their study showed that the superior labral lesions demonstrated 20% less strength in the late cocking phase than in the early deceleration phase. Overhead athletes are more prone to these types of injuries than any other athlete. For this specific athlete this was a more chronic condition. She is a common swinger and server and started to feel this pain two months after starting her preseason training. She mentioned that her pain was felt more during any overhead activity but more specifically during her services.

Clinical Examination: Prior to the athlete being referred for a radiographic imaging, an on the field assessment was performed in the athletic training room. Upon arrival of the athlete in the ATR, she was presented favoring her right shoulder (her dominant side) as if she was in pain. The assessment revealed pain on the anterior shoulder region running through the glenohumeral joint space. No obvious deformity and no apparent pain or injury to her shoulder was observed. Athlete also stated that she hears and feels a "pop" when she goes through an overhead motion. Passive and active range of motion was decreased due to pain in each motion specifically with flexion, external rotation, and internal rotation.

During the clinical special testing for this injury, the athlete tested positive when performing O'Brien, compression rotation, and Yergason's test due to pain and popping sensation. Having the athlete perform the O'Brien test, forced the head of the humerus to a full adduction and resisted shoulder extension allowing for the labrum to be agitated. This performed test was positive due to pain and the inability to perform fully. Compression rotation test was performed while the patient lied supine on the table while the examiner placed her shoulder at abduction and elbow flexion to 90 degrees. The examiner would then provide an axial load to the elbow while taking the shoulder to a passive external and internal rotation movement and resulted in a positive sign because of pain at the anterior aspect of the GH joint space. The Yergason's test was the last special test performed that also resulted in a positive sign. This test provided more information on the condition of the biceps tendon in which attaches to the labrum.

Radiographic Findings: The team physician performed initial x-rays. These x-rays were taken to show any bone deformities and widening of her GH joint in a open packed position. The x-rays findings did not show any obvious deformities within the GH joint. The results of the MRI however showed that the athlete received a complete grade I SLAP tear on her right shoulder.

Clinical Examination: During physical examination, swelling and tenderness during palpation was inspected. Pain was diffuse, and located at the anterior end of shoulder and GH joint. Clinical tests used to evaluate SLAP tears included O'Brien, compression rotation, and Yergason's tests. None of these tests were accurately diagnostic, but the reliability was found to be high towards the conclusion of a SLAP tear. The results of the MRI however, confirmed that the athlete suffered a complete grade I SLAP tear on her right shoulder. Grade I is the not always the most common grade in which involves the fraying of the top of the labrum but the labrum is still attached to the glenoid fossa. With the athlete experiencing a grade I SLAP tear, the choice of surgical procedure was given to the athlete. The athlete resorted to non-surgical rehabilitation, and began treatment immediately.



Discussion and Summary

A type 1 SLAP tear involves the fraying of the top of the labrum but the labrum is still attached to the glenoid fossa is not mainly common if not captured on time. A grade 2 SLAP tear is the most common based on mechanism of injury. These injuries occur mainly with overhead athletes such as baseball players, volleyball players, and even quarterbacks in a football team. Blackburn mentions that there is not a specific protocol for patients that have varying types of shoulder instability or labral injuries. He does mention that some research supports a progressive ROM and strengthening rehabilitation program. It is important that we combine the basic science of healing with the biomechanics for each type of surgical procedure to begin a rehabilitation program that will not overstress the suture line.. The mechanism of injury may be created in a different manner, but similarly consists of consist forceful external rotation with adduction. Physical examinations that include proper palpitations, special tests, and clinical findings are imperative in a correct diagnosis. Once a diagnosis is hypothesized, radiographic findings maybe necessary for some patients depending on severity and confidence of the diagnosed injury. Conservative treatment is followed and created with a rehabilitation protocol from the sports medicine staff.

This injury process was accurately assessed similarly during the injury of the junior college volleyball player. The uniqueness of this athlete was the fraying of the top of the labrum but the labrum is still attached to the glenoid fossa that did not result in surgical procedure. From the initial onset to full functional return to play, the athlete followed the assigned rehabilitation protocol from the sports medicine staff where the time lost resulted in only 4 weeks. Injuries to the labrum are relatively common in certain athletic populations and it is important to understand the sequence, severity, and significance associated with injury to the labrum to provide a better understanding of such a complex and diverse injury that will assist the athlete in returning in a faster time period.

References

- Blackburn, T. A., & Guido, J. A. (2000). Rehabilitation after ligamentous and labral surgery of the shoulder: guiding concepts. *Journal of athletic training*, 35(3), 373-381.
- Dodson, C. C., & Altchek, D. W. (2009). SLAP Lesions: An Update on Recognition and Treatment. *Journal of Orthopaedic & Sports Physical Therapy*, 39(2), 71-80. doi: 10.2519/jospt.2009.2850
- Familiari, F., Huri, G., Simonetta, R., & McFarland, E. G. (2019). SLAP lesions: current controversies. *EFORT open reviews*, 4(1), 25-32. doi:10.1302/2058-5241.4.180033
- Reeser, J. C., Fleisig, G. S., Bolt, B., & Ruan, M. (2010). Upper limb biomechanics during the volleyball serve and spike. *Sports health*, 2(5), 368-374. doi:10.1177/1941738110374624
- Soon, E. L., Bin Abd Razak, H. R., & Tan, A. (2017). A Rare Case of Massive Rotator Cuff Tear and Biceps Tendon Rupture with Posterior Shoulder Dislocation in a Young Adult - Surgical Decision-making and Outcome. *Journal of orthopaedic case reports*, 7(2), 82-86. doi:10.13107/jocr.2250-0685.762
- Wilk, K. E., Macrina, L. C., Cain, E. L., Dugas, J. R., & Andrews, J. R. (2013). The recognition and treatment of superior labral (slap) lesions in the overhead athlete. *International journal of sports physical therapy*, 8(5), 579-600.

Rehabilitation and Results

Following the decision of vetoing surgical repair of the her injury, conservative treatment is usually recommended for athletes with a grade 1 SLAP tear. With this patient, the sports medicine staff devised a rehabilitation protocol in which the athlete was to follow for 4 weeks. The protocol was designed with three phases with particular criteria's for the athlete to progress to the next phase. Phase I criteria consisted of diminishing pain and inflammation, restoring range of motion, maintaining muscular strength and flexibility of involved and uninvolved muscle groups. In order to reduce inflammation, the use of modalities such as electrical stimulation under the IFC settings was used for treatment. We also told our athlete that she could take anti-inflammatory drugs until inflammation decreased. In order for the athlete to progress to phase II, minimal pain, and range of motion limitations must be normalized. Phase II goals were to restore postural deficits found in our evaluation. This was done using soft tissue massage along pectoral muscle groups, trapezius, and teres minor. We also introduced scapular activation to help restore proper scapula activation. Criteria to progress to phase III was being able to restore her postural deficits with proper scapula activation. Throughout this time, the athlete was fully out of practice and only undergoing rehab in the ATR. Phase III goals consisted of strengthening the muscles found weak such as serratus, rhomboids, and the rotator cuff muscle groups (RTC). During this phase, the athlete was introduced to the thrower's ten strength program. This helped with strengthening the muscles found to be weak while properly activating her scapula. We also introduced stabilization exercises to better target her RTC muscles. Each of these exercises where done in different days with some sort of recovery modality used afterwards. Towards the end of the second week and beginning of the third, the athlete was back practicing with her team but with limited time. Her service were limited to 15 serves a practice and only setting and no swings. By the fourth week, the athlete was able to increase her serves to 20 serves a session and started to do 10-15 swings as well. After the fourth week, the athlete was fully recovered and as able to return to full practice with her teammates. Thoracic mobility was introduced as an activation exercise to better prevent any other complications.