Sport Injuries of the Labrum—SLAP Lesion Tears

Jonathon Thurber • Harry Brown

Southwestern Oregon Community College

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Rod Keller

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Rodney D Keller
Southwestern Oregon Community College
1988 Newmark Ave.
Coos Bay, OR 97420

Dear Mr. Keller:

We are submitting our research report entitled “Sport Injuries of the Shoulder—SLAP Tears” requested on March 13, 2013.

This report examines a common baseball injury of the shoulder—SLAP Tear. In order to research this we had to look at the cause, shoulder anatomy involved, determination of the type of injury, treatment & rehabilitation, prevention, and possible complications from surgical repair of the shoulder injury.

The research information we have compiled comes from orthopedic clinics, research data-bases, hands on patient care, and personal experience with this type of injury including the treatment.

In our research, we have looked in depth into the evaluation and treatment of the injury. Harry is beginning a career in diagnostic imaging which helps evaluate the type of injury while Jonathon is beginning a career in physical therapy which works with the treatment and prevention of this type of injury.

We hope you find this research report informative and knowledgeable.

Sincerely,

Jonathon Thurber

Harry Brown

Abstract

In our research paper, we cover the causes of a certain type of labrum tear in the shoulder. In addition, we described the evaluation process of the athlete and the benefits of getting arthroscopic surgery. Also, we emphasize the treatment for athletes after going through arthroscopic surgery by giving specific examples of certain types of protocols requested from the physical therapist and will explain possible complications after surgery. Furthermore, we explain ways to prevent labrum tears after arthroscopic surgery, so athletes and/or people can minimize their chances of reinjuring there shoulder. Overall, we have provided the education needed for athletes and other people through our research paper which are effective ways on preventing labrum tears from baseball and the related work environments.

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Introduction

Over the last 25 years, we have learned that there are four different classifications of SLAP Lesion tears which are caused by the sport of baseball (Browdy, 2009, n .p.). In Jonathon's experiences as an athlete, he tore the posterior, anterior labrum ligaments and cartilage in both of his shoulders. His understandings as an athlete was a frustrating and painful experience because he found himself facing several surgeries which kept him from competing, but he never gave up on his goals. The purpose of this research paper is to evaluate the cause, treatment, evaluation, and prevention of this type of injury. Our aspiration is to demonstrate how to evaluate and treat athletes before and after arthroscopic surgery. In addition, we will emphasize shoulder injury of the labrum through physical therapy and diagnostic imaging. We will provide specific examples about the causes of labrum SLAP tears from baseball, and we will expound more on how the sport's physical therapist treats the athletes. Also, we will go more in depth about the evaluation process through diagnostic imaging and the importance of reinforcing the muscles, ligaments, and joints to prevent this type of injury.

Some of the sources we will be using in our paper are Slocum Center, OrthoSpec. Med., and Atlanta Sports Medicine. These are some prime examples of the types of research we will provide, so we can demonstrate the knowledge of the four classification types of SLAP Lesion tears. In our research, we will provide our findings to athletes and others about SLAP tears. Furthermore, our purpose is to gather the information on slap tears and apply it to the careers in which Harry and I will be going into such as physical therapy and diagnostic imaging. Again, we are very passionate about educating ourselves about this type of shoulder injury to assist us in the career fields we are going into along with educating athletes who have this type of shoulder injury.

The Cause of Slap Lesion Tears

A glenoid labrum is a ligament that is a soft fibrous rim of tissue that surrounds the socket (gleniod) which helps stabilize the shoulder joint (Hoellrich , 2008, n.p.). These types of ligaments help them to be able to have full range of motion while throwing a baseball, swinging a bat, and catching a baseball. The labrum ligament is a crucial part of athletes when they perform, but once when an athlete tears their superior, anterior, and posterior labrum in baseball, they will have to have arthroscopic surgery because the labrum ligament does not heal on its own. If an athlete tears his superior, anterior, and posterior labrum ligaments they will experience limited range of motion in their shoulder.

There are several types of labrum tear, but the most common athletes have in baseball is called the SLAP Lesion tear. The SLAP lesion tears consists of superior labrum (anterior and posterior) ligaments which usually result from a fall onto an outstretched hand, repetitive throwing motion, or heavy lifting according to (Hoellrich, 2008, n.p.). It is more common with pitchers to acquire a SLAP Lesion tears in baseball because of the repetitive throwing motion by the athletes. On the right side of the page you can see Fig. 1 (Pitcher's Repetitive Throwing Motion) which shows how athletes can develop SLAP tears. The general public who are in the laboring field can develop SLAP tears because of the overhang of the position of the arm while lifting a heavy object or over extending their arms past their heads. These are some common causes of the SLAP tears in baseball and work environments.

Figure 1 Pitcher's Repetitive Throwing Motion

Source: *www.thecompletepicture.com*

Athletes who experience SLAP tears may require surgery because the superior, anterior, posterior ligaments on the humorous bone by the biceps tendon cannot heal on its own. The symptoms of this type of shoulder injury consists clicking, popping, shoulder instability, dislocations, pain while arm motion, and aching feeling in the shoulder. When people experience these kinds of symptoms they should see a specialist in Slap lesion tears. It's important to see a surgeon who has a large number of experiences on SLAP lesion repairs and other shoulder injuries because other surgeons or doctors who have less knowledge about types of shoulder injuries will over diagnose or diagnose the wrong type of shoulder injury. For example, when I had my arthroscopic surgery on my SLAP lesion tear, I was able to recover faster as compared to the other athlete who had the same type of shoulder injury because I went to a more experienced surgeon named Dr.Hoellrich out of Slocum Orthopedics of Sports Medicine in Eugene, Oregon. Alternatively, the other athlete went to a doctor from Coos Bay who diagnosed him on bank hart lesion tears, but he really had a SLAP tear. Because of the wrong diagnose, it had taken him almost two years to recover from surgery.

It's important for the doctor to make the right diagnose, so they can help repair the correct labrum ligaments in the shoulder. Finding the correct cause is extremely important for the steps of recovery because this can prolong the athlete's rehab time from competing and can create a higher chance of reinjuring the ligaments. Overall, the next step to finding the causes to this injury is to know the four different types of SLAP lesion tears. This will help the doctor evaluate the athlete before doing arthroscopic surgery.

Types of SLAP Lesion Tears

SLAP tears are classified by the extent of the injury/tear (Anderson, 2004-2012, n. p.). There are four classifications (types) of SLAP tears. Depending on the severity of the injury will determine what type of treatment will be needed.

Type I – Type I is when the margin of the superior aspect of the labrum begins to have degenerative fraying on the inner margin. This type of tear can normally be treated by rehabilitation because it does not involve detachment of the labrum from the glenoid (Anderson, 2004, n. p.). See Fig. 2

Figure 2 Type I SLAP tear
Source: *www.uwsports medicine.org*

Type II – Type II is when the upper portion of the labrum detaches from the glenoid. It may also include fraying and degenerative of the labrum as well. With this type of tear normally surgical intervention is required a long with rehabilitation (Anderson, 2004, n. p.). See Fig. 3

Figure 3 Type II SLAP tear
Source: *www.uwsports medicine.org*

Type III – Type III is considered when the labrum detaches from the glenoid along with the bucket handle. This causes unstable biceps tendon attachment. This type of tear requires surgical intervention of both the bucket handle tear and the reattachment of the labrum to the glenoid (Anderson, 2004, n. p.). See Fig. 4.

Figure 4 Type III SLAP tear
Source: *www.uwsports medicine.org*

Type IV- Type IV is the most severe tear. It includes tears from the glenoid of the labrum, bucket handle, and extension of the tear into the biceps tendon. This type of injury causes significant instability of the labrum along with unstable biceps tendon. With injury, surgical intervention is always required (Anderson, 2004, n. p.). See Fig.5.

Figure 5 Type IV SLAP tear
Source: *www.uwsports medicine.org*

As you can see, the type of SLAP tear will determine if the athlete's injury will require rehabilitation only, rehabilitation with minor surgery, or major surgical intervention with rehabilitation after surgery. For the type of SLAP tear to be determined, the athlete will go through a process of appointments which we will be discussing next.

Evaluation & Surgical Options

In the sport of baseball, many pitchers develop SLAP tears due to repetitive motion when pitching or overhead throwing the ball. As with any sport, many times these injuries are first treated with heat and ice to reduce the swelling. When symptoms such as clicking or locking in the shoulder, increased pain with overhead movement, decreased range of motion in the extremity, or pain in the front or top of the shoulder should see an orthopedic doctor to determine just what type of injury has occurred (Marcotte, 2009, n. p.). Many times the athlete only considers going to the doctor when they have severe pain or have lost considerable range of motion.

One of the best ways to assess the injury is by diagnostic imaging such as an MRI with contrast (Marcotte, 2009, n. p.). This is when dye (iodine contrast) is placed into the shoulder. This is done to make the visual images of the labrum show up better during scans. This ensures the Radiologist who will read the exam on determining how severe the damage is on labrum. Plain radiological images such as plain x-rays only shows the bones in the exam; however, not the cartilage, muscles, or ligaments. Images (Fig.6) are of an MRI with contrast showing a SLAP tear. This image is taken with the patient lying flat on their back, and shows a tube that has magnets circling around the body. Once it is determined what type of tear the athlete has, then the appropriate route of treatment can be determined.

Figure 6 MRI images with contrast of SLAP lesion tear.
Source: *http://orthoinfo.aaos.org*

After classification of the injury is determined, the physician can recommend the best route of treatment. The most common surgical option available for athletes, if surgical intervention is determined, would be shoulder arthroscopy surgery (see Fig. 7). In this procedure, a fiber optic scope is connected to a small video camera that has small specialized instruments which are then placed into a small puncture-type incision (Marcotte, 2009, n. p.). This allows the doctor to actually see inside the shoulder and access the damage without creating a large incision. This also helps reduce the amount of swelling in the area, trauma to the surrounding tissues, and easier recovery for the athlete. In the most severe cases it may be determined that complete shoulder repair or replacement is needed. In those cases the initial surgery is longer, recovery time is greater, and rehabilitation is longer. In either of these surgical interventions, the repair is done by placing an anchor in the glenoid rim and the labrum, suturing the labrum back to the bone. Depending on the size of the tear will determine how many anchors are needed to repair the tear.

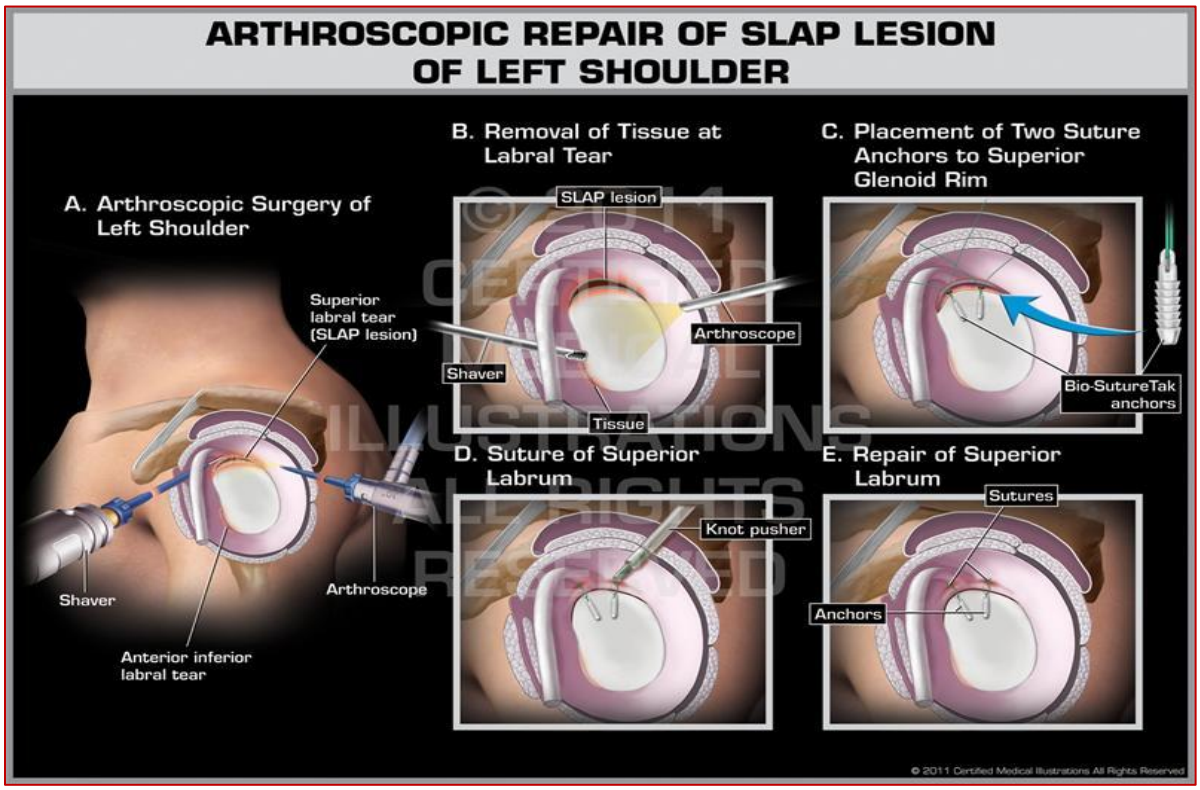

Figure 7 Repair of SLAP lesion tears.
Source: *www.certifiedmedicalillustration.com*

Treating SLAP Lesion Tears

The treatment after an arthroscopic surgery can be minimal to quite complex. There are specific types of protocols on the extent of how bad the SLAP lesion tears are. The time frame from recovery is up to 9 months of rehabilitation with a physical therapist. After surgery the athletes wear a sling up to 6 weeks, and the first three days the athlete can't take the sling off because it's a crucial time for healing.

During the six weeks of recovery it's important for the athlete to squeeze a stress ball in each hand so the athlete can improve his grip while resting the shoulder. In addition, the athlete should strengthen none surgical arm so they can compensate and speed up the healing process. Each day the athlete needs to stay hydrated, have a lot of carbs, and protein so they can have energy to heal. From Jonathon's experience, this is one of the most important parts of recovering as an athlete because without eating balanced nutrition you won't be able to heal as fast. It's important to take your sling off after the three days of surgery, so the person can avoid frozen shoulder and help speed up the healing process. Furthermore, the athlete needs to ice his shoulder at least 18 hours a day for the first week, if the athlete wants to minimize the inflammation from the arthroscopic surgery and protect the anatomic repair. When the athlete gets passed the first week, they should start rehabilitation with a physical therapist. Once the athlete starts the rehabilitation, one of the most important things is to follow the protocols that the therapist has lined up, and be honest with him when athletes feel pain while doing small ranges of motion of the shoulder. Week three, the athlete is being assisted by physical therapist to flexion elevation plane to 70 degrees, external rotation to 20 degrees, and internal rotation to 30 degrees according to (Wilk, 2003, n. p.). By following the guide lines put forth by the physical therapist, this will have significant gains to increasing range of motion. (See Fig. 8.)

Figure 8 shows physical therapy after repair of SLAP lesion tear.

Source: *www.orthopaedicsports.com*

Essentially, the main goal in the six weeks is to reduce the swelling, pain, stiffness, and increasing range of motion gradually in the shoulder. However, from Jonathon's personal experience, the ultimate goal should be doing your homework, listen to physical therapist, and have a positive attitude while going through this process. From personal experience it is hard to do, but take one day at a time and keep moving forward in the rehab process. By doing all of these protocols in the six weeks of recovery, the athlete should be physically able to go through the next step in rehabilitation.

Starting seventh week, the focus should be on, "Improving the flexion and elevation plane of scapula to 145 degrees, improve internal rotation, external rotation, and abduction to 45 to 50 degrees" (Wilk, 2003, n. p.). In addition, the athlete will begin gentle stretches to the shoulder while being assisted by a physical therapist and will begin "Gentle proprioceptive neuromuscular facilitation (PNF) manual resistance" (Wilk, 2003, n. p.). For example, during Jonathon's seventh week of rehabilitation, he did exercises by pushing against the pillow (external flexion), squeezing the pillow, and drawing the arm against the pillow toward the body (internal flexion). Additionally, the athlete will begin elbow flexion and extension. These are the protocols for week seven, which can be one of the most challenging aspects in the rehab process because it is dependent on athlete's tolerance of pain. It is important for the athlete to not overdue and to be honest to the physical therapist. These are the objectives for week seven.

The main goals from week 8 thru12 are to gradually improve internal, external, elevation plane, and abduction to 75 to 95 degrees in all range of motion. The athlete needs to communicate to the therapist if they are experiencing pain while doing these exercise because over extending can prolong the rehabilitation time. Next, continue to improve your resistance exercises so they can improve strength and flexibility in the elbow and shoulder. In addition, the athlete needs to start doing polys to increase range of motion. While doing these exercises the athlete needs to keep eating healthy and staying hydrated as well. Again, these are the main goals for week eight to twelve.

In the next rehabilitation period, twelfth to fifth week, the athlete will start to begin isotonic cuff, per scapular, and shoulder strengthening program (Wilk, 2003, n. p.). Additionally, the athlete will keep continuing resistance exercises, elbow flexion, and extension. Eventually, the athlete will do bicep isometric exercises which will increase their arm strength. This time of the rehabilitation process is probably the most difficult period. In my personal experience with this type of injury and rehabilitation, many times when you experience less pain, close to full range of motions, and feeling as if the injury is fully healed, we tend to forget that the interior, posterior, superior labrum ligaments have not completely healed. Thus, remembering to finish the rehabilitation program before entering back into full range of motion. It's still important for the athlete or the person to keep a positive attitude because attitude makes a big difference in your healing process. Basically these are the goals for 12 to 15 weeks.

According to the website (Wilk, 2003, n. p.) the goals for week 16 through 20 are keeping full range of motion; improve muscular strength, endurance, and power. Additionally, gradually enhance functional exercises as well. When the athlete succeeds past these weeks the physical therapist will add more exercises to the athlete; such as throwing motion, endurance training, light plyometric, fundamental exercises, and manual resistance. The physical therapist will push the athletes, but minimize the intensity if the exercises are causing too much pain. For example, once when Jonathon started lifting light weights, he began to do more reps than he should have and started feeling a little pain in his left shoulder. He reduced the intensity by the number of reps and increased longer breaks to stop the pain. Again, the athlete needs to not be super man and over push himself because that can delay the healing process.

Furthermore for week 20 to 22, the athletes in baseball will need to be reintroduced to a minimal throwing program to strengthen those shoulder muscles according to (Wilk, 2003, n. p.). In addition the athlete will need to maintain the regular exercises of stretching, plyometric, strength training, and maintaining shoulder instability. Also, the person or athlete will need to do intense leg workouts to speed up the healing process because when you work out your legs the muscles will strengthen not only in your legs, but in your upper body. Basically, when one part of your body strengthens it will enhance the healing process in the injured part of the body. Gradually the athlete is becoming closer to transitioning into the normal exercises for the sport of baseball which is another reason why athletes will need to strengthen their legs.

Figure 9 shows physical therapist evaluating athlete at the end of rehabilitation

Source: www.youtube.com/channel/HCJkczA

Overall, toward the very end of the 6 months to 9 months the athlete will be reevaluated by the physical therapist to be released to participate in sports, but still have some restrictions on exercises in baseball such as pitching, throwing, and sliding. In addition, the athlete will need to continue the rehab exercises at home if they want to prevent another SLAP Lesion tear. This part, I have to say, is the most important because from experience if you don't keep up with your bans and other rehab you will reinjure the labrum. This is the most important part of recovery because now it needs to be a lifestyle since the athlete or person had surgery. When the athlete or person is clear from the physical therapist, they will be allowed to return to sports or work with some limitations. This is rewarding for the athlete or person because they have accomplish the ultimate goal, which is successful completing the protocols of a major shoulder injury, repair, and rehabilitation.

Complications from SLAP Tear Repair

As with any type of surgery, complications can arise from SLAP tear repair (Cluett, 2012, n. p.). Although complications are rare, there are a few things to watch for after you have been released from the surgery center. For example: if you start experiencing fever, nausea, and increased pain, you may need to contact your physician concerning this (American Academy of Orthopaedic Surgeons, 2009, n. p.). This could be a sign of infection of the surgery site. In this day and age the super bug "MRSA" *Methicillin-resistant Staphylococcus Aureus* has become prevalent in many surgical sites due to the fact that it is resistant to most antibiotics. Prompt diagnose and treatment is essential to preventing failure of repair so that healing can begin.

Another complication from the surgery is frozen shoulder. This is when the shoulder loss all range of motion. This is normally caused by the patient leaving their arm in a sling for too long. The muscle, joints, and ligaments become too recoiled and the person is unable to move shoulder. The key prevention is to only keep the arm in a sling for immobilization of the shoulder for the recommended time period.

Figure 10 Image of athlete in sling after SLAP Lesion repair

Source: *newshopper.sulekha.com/damaso-mate_photo_1...*

Prevention of SLAP Tears

Although shoulder injuries can occur even with the best preventive measure, there are some preventive measures that can be performed in order to get the muscles, joints, and ligaments warmed up prior to anytime of physical activity; also, ones with repetitive motion which can be the cause of SLAP lesion tear. The key is proper warming up prior to physical activities which will increase muscle temperature; body temperature, dilate blood vessels, increase blood temperature, improve range of motion, and give the mind mental preparation (Quinn, 2011, n. p.). Warming up will decrease muscle stiffness, lessen risk of injury, and improve performance.

Warming up the muscles, joints, and ligaments of the body can be done by stretching, jumping jacks, running in place, ski jumps, mountain climbers, etc. Some stretching can consist of raising elbows straight up to pulling elbows toward the chest with the opposite hand (Suttle, 1999, n. p.).Using large rubber bands (There-a-bands) or towels for resistance can also help warm up your muscles, joints, and ligaments. Always remember slow proper warm-up is the key to successfully warming the muscles, joints, and ligaments to prevent injury (Suttle, 1999, n. p,). Also with stretching and warming up, this allows the labrum to become thicker and more flexible to with stand repetitive motion.

Flexibility is the key to any over stretching or repetitive motion that is place on the body. With any type of physical activity the benefit of flexibility can have a lasting impression on what type of state the body is in after the activity is done. We are sure that we are not alone when it comes to not stretching and warming up prior to physical activity. This is important to do because it prevents injury and increases athletic performance for any athlete or person.

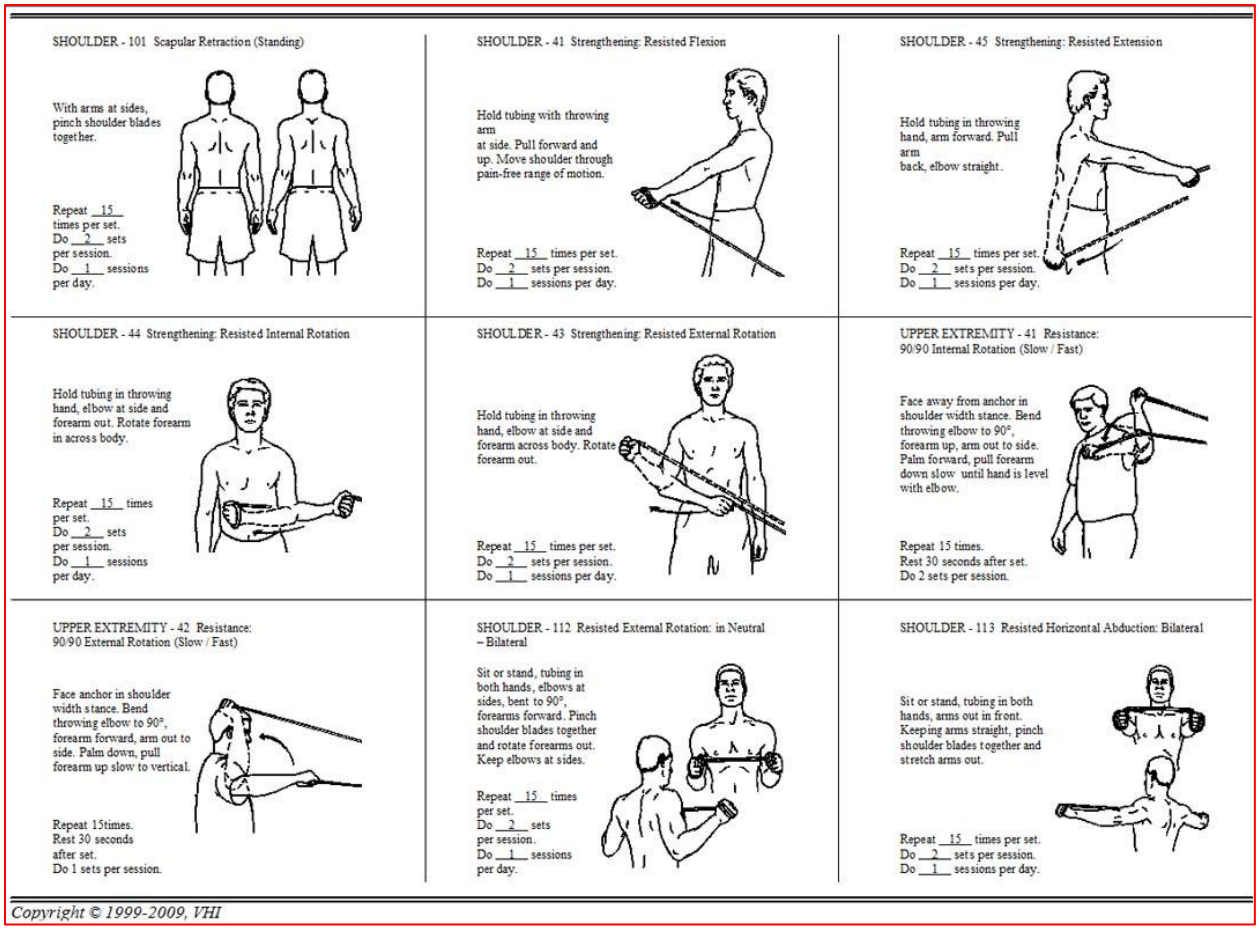

Fig. 11 shows some exercises for strengthening the shoulder.

Source: *www.fullwindup.com/2012/02/protect_your_shoulder*

Another key to preventing injury to the body is strength training, especially in the shoulder. Strengthening the muscles which prevent the humeral head from popping out is another key to prevention of SLAP tear injuries (Goldfarb, 2010, n. p.). These muscles include the deltoid, subcapularis, supraspinatus, and subcapularis muscles. By strengthening these muscles, it provides added support along with the labrum to with stand repetitive motion. There are several exercises that can be done to strengthen these muscles. For example; dumbbell bent-over row, upright shoulder external rotation w/dumbbells, side lateral raises, and seated row with resistance bands. See the Fig.12, 13, and 14.

Fig.12 External rotation exercise for Teres minor muscle

Source: *Exerciseforshoulder.com*

Fig. 13 Tube external rotation for teres minor muscle side lateral rises for the subcapularis, infraspinatus, supraspinatus, teres minor, and deltoid muscles.

Source: *spectrumfitness.blogspot.com*

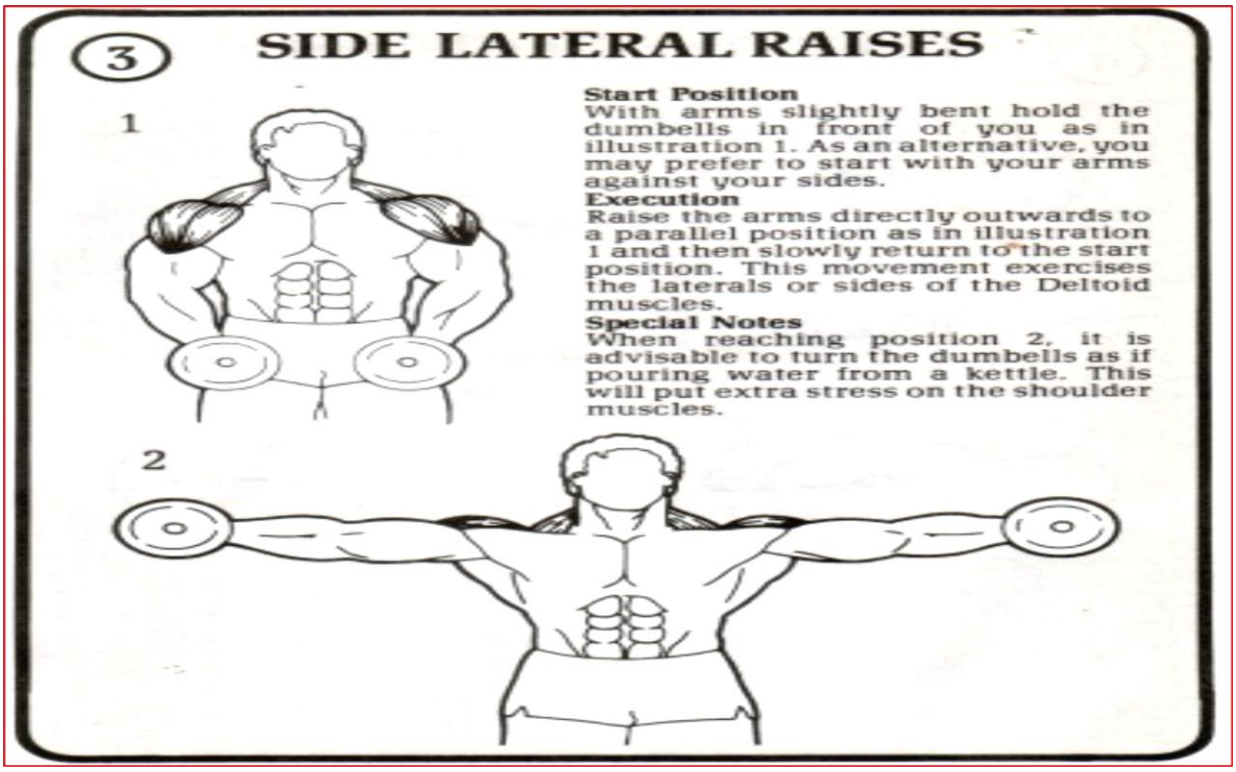

Figure 14 shows images of the muscle groups being strengthened by side lateral raises

Source: *http://www.standsgym.com/images/s.*

Another key in prevention of injury is making sure the athlete gets enough rest to perform at a safe level to ensure good body mechanics are being used to prevent injury. Good nutrients is also needed to ensure the body is not lacking the nutrients needed for the muscles, joints, and ligaments to remain adequate to with stand physical endurance. Also, keeping the body well hydrated is essential to balancing the body's functions. When our muscles are physically active they need fluids to replenish what is lost during those activities.

Conclusion

In conclusion, we have discussed all aspects of SLAP lesion tears. We provided specific examples of the cause and different types of SLAP lesion tears. In addition, we have explained the evaluation process before and after arthroscopic surgery by providing specific information about the procedures of diagnosing the injury by diagnostic imagining (MRI) and repair of injury by means of arthroscopic surgery. Also we have described the treatment of the athlete after surgery by explaining the protocols for this type of shoulder injury. Therefore, we expounded more on the prevention of this type of injury by providing the research from the websites. We also have covered the possible complications from this type of surgery. With the research we have done, we hope athletes and individuals who encounter SLAP lesion tears can benefit from this research.

Through four surgeries that Jonathon experienced, he never gave up because he wanted to win state competition. These surgeries require hard work, determination, following direction, and mental toughness to come back and compete which helped him to win his state championship. This has given Jonathon a passion to help other athletes and people because he has experienced being a patient in physical therapy. Harry has experienced hands-on with patient care through his prior careers in the medical field which have given him the passion to be part of determining what type of injury athletes have through diagnostic imaging. We both have provided the important information to not only educate ourselves, but to help the athletes and people who went through arthroscopic surgery. Successful repair of SLAP tear through diagnostic imaging, arthroscopic surgery, and physical therapy.

Figure 15 athlete returning to sport with full range of motion
Source: *File:Baseball pitching motion 2004.jpg - Wikipedia, the free*

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