Northern Illinois University

**Prone to Rotator Cuff Injuries and Tears: and the Best Way to Treat These Causes**

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Amy Czupryn

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Student Name (print or type): Amy Czupryn

Faculty Supervisor (print or type): Chris Hubbard

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ABSTRACT (100-200 WORDS): This paper helps explain to people what the rotator cuff is all about. The motive of this paper was to find out why your body as a adolescent versus an adult affects the rotator cuff muscle tears and injuries differently and then the best way to treat these causes. The rotator cuff muscles are really fascinating the way they work together to allow the shoulder to function. People can cause injuries to their muscles, which in turn creates a lot of pain. Some of the causes can depend on your age and the overall shape your body is in. The main difference between the rotator cuff muscles in a child versus an adult is the connective tissue component. When injuries occur to the rotator cuff, the connective tissue never fully heals and so that is why healing can be more difficult in an older adult. Trying to find the best treatment really depends on the individual and what they think they will.

**ROTATOR CUFF- WHAT IS IT?**

The shoulder is comprised of bones, ligaments, tendons and muscles that connect the arm to the torso. The three bones that make up the shoulder are the collarbone (clavicle), upper arm bone (humerus), and the shoulder blade (scapula). The shoulder has two joints that work together in arm movement. The acromioclavicular (AC) joint is the gliding joint between the clavicle and the humerus. The acromion is the edge of the scapula that forms the AC joint, which gives us the ability to raise our arms above our head. The Glenohumeral joint is a ball and socket type joint. The ball is the top rounded part of the humerus and the socket is the bowl shape part of the scapula, called the glenoid, where the ball fits in. This joint allows the arm to move in a circular rotation, towards and away from the body. The labrum is a piece of cartilage that cushions the humerus head in the glenoid and also helps stabilize the joint. Your arm is kept in your shoulder socket by the rotator cuff. The rotator cuff is a network of four muscles that come together as tendons to form a type of covering around the humerus head in the glenoid cavity (AAOS, 2011). The rotator cuff is attached to the humerus, which is attached to the shoulder blade that in turn helps to rotate and lift your arm.

The four muscles, which all originate on the scapula, are known as the supraspinatus, infraspinatus, teres minor, and subscapularis. The subscapularis muscle is innervated by subscapular nerve and inserts on the lesser tuberosity. It allows the arm to turn inward through an internal rotation. The supraspinatus inserts on the greater tuberosity and is innervated by the subscapular nerve. Even though the supraspinatus muscle is small, it plays a critical role in allowing the arm to elevate, either to the front or to the side, and allowing the arm to move away from the body. The supraspinatus tendon can be found running down through the narrow gap under the acromion, which lies very close to the Glenohumeral joint. The supraspinatus tendon is responsible for abducting the arm the first 10-15 degrees, so then the deltoid muscle can then do

the rest of the movement. This helps to surround and enclose the shoulder, while helping to resist the gravitational forces placed across the shoulder joint from the downward pull of the arm. It helps stabilize the head of the humerus in place against the Glenoid Fossa. The infraspinatus inserts on the greater tuberosity and is innervated by the subscapular nerve as well. The infraspinatus muscle assists the arm when something needs to be lifted. It also turns the arm outward, in an external rotation. The teres minor inserts on the greater tuberosity too, but is inverted by the axillary nerve instead of the subscapular nerve. The teres minor also helps in the turning of the arm outward, just like the infraspinatus.

Working together these four muscles provide the Glenohumeral joint with dynamic stability, which in turn helps to control the joint during rotation (Sports Injury Clinic, 2012). The Glenohumeral joint is known as the ball and socket joint because it allows the arm to move in all different planes, forward, backward, and side to side. It is the most mobile joint in the body, but definitely not the sturdiest. The static stabilizers of the shoulder are the capsule and labrum complex, which can include the Glenohumeral ligaments (Bilal, 2011). Between the rotator cuff and the acromion, there is a small lubricating sac called the bursa. It allows the rotator cuff to freely glide when the arm is being moved. If the rotator cuff tendons become injured or damaged, the bursa can become very painful and inflamed adding more pain to what you are already feeling.

**CAUSES:**

Several causes that can contribute to rotator cuff problems can include injury, overuse, poor blood supply, a fall and degeneration. An injury to the rotator cuff can happen while trying to lift a heavy object above your head or when trying to catch a heavy object. When trying to repeat the same movement over and over again, that puts a lot of stress on the tendons and

muscles of the rotator cuff. Overusing the muscles and tendons, especially after a period of inactivity can be very painful. Rotator cuff problems typically occur in individuals who perform repetitive overhead motions that can cause stress to the rotator cuff itself (Shiel, 2012). Poor blood supply or lack thereof as we age becomes less in our tendons. It may seem unusual that blood supply can affect how our tendons work, but without a good blood supply the natural ability for the body to repair the damaged tendons can be impaired leading to a tear. An interesting fact recently discovered by Seacoast Orthopeadics is that, "smoking can cause damage to the circulation to the tendons and bones, which results in a slower healing time," (2012). Something as easy as falling onto your outstretched arm can cause a dislocation of the muscles to tear by a traction injury that is forcefully pulled and overloads the tendon, which exceeds the weight a tendon can tolerate. As the rate of tissue breaking down exceeds the rate of tissue that is healing, it can lead to degeneration of the tendons. This coincides with how our tendons seem to be stronger in our adolescent years because as individuals age, our tendons will begin to lose strength because their internal ability to heal and regeneration starts to decrease (Seacoast Orthopeadics, 2012).

As we get older, we slowly start to lose our flexibility and lose muscle mass. Changes in connective and muscle tissue are often related to reduced physical conditioning as we age. Dr. Maroon (2012) states, "The ligaments and tendons begin to dehydrate due to reduced production or retention of lubricants between their connective tissue fibers." With this being said, calcium deposits start to build up and replace muscle fibers with fatty collagenous fibers that reduce joint and muscle mobility and strength. These changes as we get older result in significant balance problems and increases the risks of catastrophic falls. "Chronic muscle loss affects 30% of people older than 60, and more than 50% of those older than 80," (Dr.Maroon, 2012). Muscle

loss as we age increases the likelihood of having a disability dramatically, which increases the chance that we will need canes and walkers to get around from place to place.

There is a substance in your body that is made naturally and found in your joints, it is called glucosamine. It is made from glucose, which is sugar, and an amine group (NH2) that is found in most healthy joints. Our body uses glucosamine to make other substances that form the basis for new connective tissue. "As we age, we become less able to renew our tissues, we are less effective at combating inflammation in the body (which causes pain) causing our physical tissues to slowly degenerate," (Seven Seas, 2011). Joints can become worn or damaged and that increases the need for our body to have to get more of the building blocks it uses to renew and replace what is damaged already. Damaged joints more than other joints need glucosamine to help renew the damaged joints, but this can sometimes be limited by the short supply of glucosamine. Glucosamine can be found in a couple different places in our body. It can be found in cartilage, which is the softer tissue that surrounds the end of your bones between joints. This helps the tissues around your bones stop them from grinding together. It can be found in synovial fluid, which is the lubricating fluid around the joints. Synovial fluid is very important around your joints because it is what cushions the movement and impact throughout your every day routine. It can be found in tendons, which connect muscle to bone. The last place it can be found is in the ligaments, which have stretchy elastic connective tissue that can hold bones to other bones in the joints. It is a good idea to take a supplement in the form of tablets of glucosamine, because it can increase the levels of glucosamine both in your blood and in the synovial fluid in your joints. This is huge because as we age, your connective tissue will need plenty of glucosamine for renewal and repair of damaged joints. "Glucosamine is used to help the body to repair damaged joints and this process can be slowed down by lack of glucosamine in the joints,"

(Seven Seas, 2011). Typical signs of a degenerative joint could be arthritis in the morning, back pain, recurrent joint injury or stiff joints.

Something else that happens while we age is the development of bone spurs on the underside of the acromion (AAOS, 2011). If this happens, the spurs can rub against our rotator cuff when we lift our arms above our head and gradually wear down the tendons and muscles. As this continues to happen, the spur can gradually wear down the tendons and muscles leading them to become weaker and can eventually turn it into a tear. This is a condition known as shoulder impingement.

One of the most common causes of rotator cuff pain is when a part of the rotator cuff becomes torn. A rotator cuff tear involves a disruption of tendon fibers from their insertion into the humeral head (Seacoast Orthopeadics, 2012). Tendons that are torn can begin to fray, and if the damage continues to progress, the tendon will completely tear. There are two different types of tears: partial and full-thickness tears. A partial thickness tear can damage the soft tissue in the tendons but not completely, hence the name partial tear. Many individuals do not even know that they have a tear. A partial thickness tear can turn into full thickness tear if the tear continues to wear down the soft tissue of the tendons into two completely different pieces. Many full-thickness tears leave a hole in the tendon and completely detaches from the head of the humerus (AAOS, 2011). Any of the rotator cuff tendons can tear at any moment, but the most common rotator cuff tear is the supraspinatus tendon. This is because it is positioned between the humeral head and the acromion bone that provides a roof above the Glenohumeral joint. If the supraspinatus tendon continues to tear, it can extend towards the front of the rotator cuff muscles, to the subscapularis tendon or to the back, to the infraspinatus tendon. Cluett (2009) says, "At the time of arthroscopy the doctor will be able to tell if a partial tear needs surgery or

not by seeing if less than 50% of the tendon is torn, and if this is true then the tear usually does not require repair." Sometimes performing surgery helps remove the inflamed bursa sacs, damaged and frayed muscles relieving the individual of some pain. If more than 50% of the tendon is torn, then one of the rotator cuff repairs will take place. Partial thickness and full thickness tears get there name for how big the tear is resulting from either an acute injury or chronic degeneration.

An acute injury is usually a result of a sudden powerful movement. Symptoms can include: a sudden tearing feeling in shoulder then followed by a severe pain, limited arm movement because of the pain and or muscle spasm, severe pain, tenderness or an inability to abduct the arm. Acute tears in patient should generally be fixed in a timely manner, especially in younger individuals who need to meet specific physical demands requiring a lot of strength in their arms. A chronic injury usually develops over a period of some time, and is due to the tendon lying near the bone and rubbing up against it. It usually happens in individuals who participate in overhead activities consistently. These symptoms can include: gradually increasing pain leading to sporadic worsening of pain, pain at night that affects sleeping patterns, atrophy of the muscles causing some weakness, and a crackling feeling when moving the shoulder. All these symptoms lead the arm to be incapable of abducting and unable to do any activities with the arm above the head.

An interesting fact from the American Academy of Orthopaedic Surgeons (2011) states, "Most rotator cuff tears are largely caused by the normal wear and tear that goes along with aging, people over 40 are at a greater risk." Especially, if the older adults are constantly doing repetitive lifting and overhead activities in their line of profession like painters, carpenters or even professional athletes. A tear can also be found in adolescence and young adults who do a lot

of sporting activities that require overhead work. But when you are younger, most tears are caused by a traumatic injury, like a fall. That is why seeing a doctor right away is a good idea to assess how bad the injury might be. Especially because the goal of any type of treatment is to restore normal function and reduce the pain.

**DIAGNOSIS:**

When it comes to diagnosing a rotator cuff injury there will be some noticeable signs like pain, decreased strength or an inability to perform normal tasks. Pain can start to be noticed gradually until it becomes unbearable. It is usually located over the outside of the front and side of the shoulder. The pain can increase at night, or when the shoulder is moved away from the body, like when you perform an overhead activity. Decreased strength can cause an inability to raise the arm overhead, or to hold the arm directly out from the body. A doctor can test each of the tendons by isolating them to figure out the extent of the tear. All of this can make it difficult to perform activities of daily living like reaching behind the back, combing your hair or even sleeping. To diagnose a tear, an MRI or ultrasound can be used. There are benefits to using either method. An ultrasound can be done immediately, is pretty accurate and cost effective. An MRI is definitely more costly and not always accessible to all individuals. Although it is expensive, it can show the soft tissues of the rotator cuff tendons, which gives the doctors an advantage to see where the tear is located within the tendon and the size of the tear (AAOS, 2011). MRI's can also see the quality of the muscles and the underlying structures which helps to determine if surgery is needed.

Rotator cuff tears and injuries are more common than you think. The American Academy of Orthopaedic Surgeons (2011) states, "When one or more of the rotator cuff tendons is torn, the tendon can no longer fully attach to the head of the humerus." Some people do not even realize

that they have a tear because they do not feel the pain. Rotator cuff tears have been shown in over 70% of individuals over the age of 80 and then only 30% of individuals younger than that.

**PREVENTION:**

Some helpful hints to prevent rotator cuff injuries and tears would be to avoid excessive overhead activities whenever possible. Try to work on strengthening your shoulders, with a few exercises every day to make sure you are not losing muscle. When exercising or using your shoulders excessively, do not work or play through the pain. Learn to take little breaks in between vigorous lifting, overhead work and sporting activities. Remember to always carry heavy objects close to your body when able to. Try to use good body mechanics standing straight with your shoulders back. Last but not least, avoid unnecessary pressure on the affected shoulder by lying on your other shoulder.

**TREATMENT:**

A damaged rotator cuff is the most common condition for which patients seek some kind treatment and there are numerous options depending on what might be right for the individual. There are more than 4.5 million visits with clinicians, with approximately 40,000 surgeries per year in the United States (Razmjou, et al., 2011). How to treat a rotator cuff depends on a few factors which include: age of patient, tear size and degree of retraction, amount of functional disability, physical demands of individual, ability to tolerate and comply with the necessary rehabilitation, and then presence of other medical problems that can complicate treatments. Some nonsurgical treatments can include steroid injections, strengthening exercises with physical therapy, activity modification, non-steroid anti-inflammatory medication and rest. One of the most well-known steroid injection medications is cortisone. It is a very effective anti-inflammatory medicine that helps reduce the inflammation and stress on that particular area of

the body, in this case the rotator cuff. When getting cortisone injected into the tendon it can stay active longer usually lasting for a couple days. This is because cortisone the body produces naturally from the adrenal gland is being injected right into the bloodstream and is only short lived. Depending on where the pain lies in the rotator cuff, different strengthening exercises will help to restore movement and strengthen the shoulder at the same time. Physical therapy is one place where specific strengthening and flexibility exercises can be given to an individual to help improve their range of motion, relieve pain and prevent from further injury in the shoulder. In essence of doing strengthening exercises, make sure to avoid exercises that cause more shoulder pain. Ibuprofen is a type of non-steroidal anti-inflammatory medication that can help reduce pain and swelling in the area. Most people tend to take this for daily aches and pains. Last but not least, rest is a key component with non-surgical treatments because keeping still and relaxing the muscles gives you less susceptibility to injuring the muscles even more. So just be cautious and try to limit your daily overhead activity movements.

Surgical treatments are recommended by doctors if the pain does not decrease after nonsurgical treatments. Most of the time, a complete rotator cuff tear will not heal by itself. It usually requires surgery if your goal is to have your shoulder return to its optimal functioning. Some good reasons why to get shoulder surgery might be because the symptoms have lasted longer than six to twelve months, a tear is larger than three centimeters, significant loss of function or weakness in the shoulder, and the tear was caused by a recent acute injury. Generally surgical repair of a rotator cuff involves re-attaching by stitching the tendon to the head of the humerus (AAOS, 2011). There are a few choices when coming to the option of surgical repair for the rotator cuff. There is open repair, all-arthroscopic repair, and mini open repair.

All of three of these surgery techniques have one goal in mind and that is to get the tendon to heal properly. According to AAOS, the size of your tear, anatomy and the quality of the tendon tissue and bone determines what kind of surgery you will have to repair your tendon (2011). An open repair is typically used if the tear is large so it requires a traditional open surgical incision that can be up to a few centimeters long. The incision can be made over the shoulder and the deltoid muscle is detached to visibly see the torn tendon better. If there are bone spurs present, they are removed from underneath the acromion. Tendon transfer, or reconstruction, can also be possibly done if the tendon is large enough. The second type of surgical repair option is the All-Arthroscopic Repair. A small camera is inserted into the shoulder joint that is called an arthroscope, which displays onto a television screen, so that the doctor can use it to guide the little surgical instruments. This causes little incisions instead of large ones because the surgeon is using little surgical instruments. It is usually an outpatient procedure because it is the least invasive technique to repair the rotator cuff. The final type of surgical repair is the Mini-Open Repair. It deals with newer technology and instruments used to repair a tear through a small incision usually three to five centimeters long. During this treatment arthroscopy is used to evaluate and treat other structures that could be damaged around the tear which can be fixed as well, and there is no need for the deltoid muscle to be detached. This type of tendon repair is done by looking at the tendon and not through a video monitor. After the arthroscopy portion of this procedure is completed, the mini open incision is repaired.

Depending on the size of the tear, most of the treatments have a 40-90% success rate at fixing the torn rotator cuff. Surgery has up to a 94% success rate for individuals who do not have that extensive of a tear. The older you are, the longer it takes for your body to heal due to the physiology of your body.

**REHABILITATION:**

After surgery takes place, rehabilitation plays a huge role in helping an individual get back to their activities of daily living. It can take up to several months to recover and usually four to six months after surgery for most individuals to have a better range of motion and adequate strength. Physical therapy is a great way to regain strength and motion. Most therapy progresses in stages, there is three to be exact. The first stage is *immobilization.* While the tendon heals you need to keep your arm from moving all over the place. It is usually recommended to wear a sling for the first 4-6 weeks. It could be longer depending on the severity of the torn muscles. The second stage is *passive exercise,* where the muscle is beginning to repair but the muscles are still very weak. When the doctor decides it is ok to move your arm and shoulder, a therapist can give you a range of activities that can help improve the range of motion. The therapist will move your arm around in different positions, while supporting it. This usually happens within the first 4-6 weeks after surgery. The final stage is known as the *active exercise* stage. It comes after immobilization and passive exercising, indicating that you will progress the difficulty of your exercises. This could mean moving your muscles on your own, which will gradually increase your strength and improve motor control in your arm. At 8-12 weeks the therapist will give you exercises to start strengthening exercise program for your arm. Therapy has to be a commitment. The majority of patients recover just fine after surgery, as well as have improved shoulder strength with less pain if they follow their rehabilitation plan that is set in place for them by their physical therapist.

The exercises shown below are only a handful of many exercises that can be performed to help strengthen the surrounding muscles and the rotator cuff muscles themselves. All of these exercises were provided by the American Academy of Orthopaedic Surgeons.

The first exercise is called the **Pendulum** and works the deltoid, supraspinatus, infraspinatus and subscapularis muscles. Make sure you do not round your back or lock your knees.

1. Lean forward, place one hand on a counter for support and let your other arm dangle freely at your side.
2. Start to gently swing your free falling arm in a clockwise motion for 2 sets of 10 and then repeat, going in a clockwise motion.

The second exercise is called the **Crossover Arm Stretch** and it works the posterior deltoid muscle.

1. Start by relaxing your shoulders and then pull one arm across your chest as far as possible gently and then use your other arm to hold it there for 30 seconds.
2. Relax for 30 seconds and then repeat with the other arm. Do not pull or put pressure on your elbow. Do this four times on each side.

The third and fourth exercises are similar; you will need a light stick, like a yardstick. One requires you holding a stick in front of your stomach, while the other deals with holding the stick behind your back. The **Passive Internal Rotation** works your subscapularis.

1. Hold a stick behind your back with one hand and grasp it lightly on the other side with your other hand.
2. Pull the yardstick passively horizontally to stretch to the point of feeling it without any pain. Hold it there for 30 seconds and then relax for 30. Repeat on each side four times. Make sure to not lean over or just twist side to side pulling on the stick.

The similar exercise is called the **Passive External Rotation** and it works the infraspinatus and teres minor.

1. This time grasp the stick in one hand, and cup it in the other in front of your stomach area.
2. Make sure to keep the elbow of the shoulder you are trying to stretch tight against the side of your body and push the stick out from your body.
3. Hold for 30 seconds, then relax for 30 and make sure you keep your hips facing forward. Repeat four times on each side.

The fifth and sixth exercises are just opposites of each other. Internal Rotation works the pectoralis and subscapularis. External Rotation works the infraspinatus, teres minor and the posterior deltoid. While doing either of these exercises make sure to squeeze your shoulder

blades together when you pull your elbow back and try to keep your elbow as close to your side as possible. You will need a three foot elastic band for the following **Internal Rotation** exercise.

1. Take the three foot elastic band and attach it to a door knob or shove it next to a door hinge on a closed door.
2. Stand holding the band with your elbow bent and right at your side. Keep your elbow close to your side and bring your arm across your body to your opposite hip.
3. Then slowly return to the start position to repeat, 3 sets of 8.

The following is the **External Rotation** directions, which also requires an elastic band.

1. Once again attach an elastic band to a door knob or shove it next to a door hinge on a closed door.
2. Stand holding the band with your elbow bent and right at your side. Keep your elbow close to your side and slowly rotate your arm outward.
3. Slowly return to your start position and then repeat for 3 sets of 8.

The seventh exercise is called the **Scapular Retraction/Protraction** and works the middle trapezius and serratus. For this exercise you will need a light weight and place to lay flat on your stomach.

1. Lie on your stomach on a table or bed, face down, with injured arm hanging over the side with a light weight in your hand.
2. Keep your elbow straight and lift your weight slowly by squeezing your shoulder blade toward the opposite side of your body making sure you aren't shrugging your shoulder toward your ear.
3. Return it slowly to the starting position and repeat 2 sets of 10.

The eighth exercise is called **Bent-Over Horizontal Abduction**, which works the middle and lower trapezius, teres minor, infraspinatus, and posterior deltoid. For this exercise you will need a light weight as well and a place to lay flat on your stomach.

1. Lie on your stomach on a table or bed facing your injured arm hanging over the side.
2. Keep your arm straight and slowly start to raise your arm up to eye level with the light weight.
3. Then slowly lower it back to the starting position, repeat 3 sets of 8.

The ninth exercise is called **Internal Rotation**, but it is different from the exercise already named above. It helps work the subscapularis and teres major muscles. You will need light weights for this exercise.

1. Lie on a firm, flat surface on the side of your affected arm. Make sure to put a pillow or towel underneath your head to keep your spine straight.

2. Place injured arm on the flat surface, with a 90° angle with the weight in that hand.
3. Keep your elbow bent and against your body and slowly rotate your arm at the shoulder raising the weight into a vertical position.
4. Then slowly lower the weight to the starting position and repeat 2 sets of 10. Make sure you do not roll your body while lifting the weight up and down.

The final exercise is called **External Rotation** and it works the infraspinatus, teres minor and posterior deltoid. You will need a light weight to perform this exercise.

1. Once again you are going to lie on a flat surface except this time on your unaffected arm, which will help to cradle your head.
2. Hold your injured arm against your side, with your elbow bent at a 90° angle.
3. Keep your elbow against your side and slowly rotate your arm, raising it to a vertical position.
4. Then slowly lower it to its starting position to a count of five. Repeat this exercise for 2 sets of 10.

These exercises may seem simple but after surgery it will help to build the strength back up in your arm and shoulder area. By strengthening the muscles that support your shoulder, that will help dramatically to keep your shoulder joint stable, especially since shoulder joint is one of the most mobile joints in the body. Keeping these muscles strong can relieve shoulder pain and prevent further injury from occurring. Stretching the muscles that you strengthen is also very important for restoring your range of motion and preventing injury. By gently stretching after strengthening exercises, it will help reduce muscle soreness and keep the muscles long and more flexible. After an injury or surgery, an exercise conditioning program will assist in your return to your activities of daily living and enjoy a more active and healthy lifestyle no matter what your age. A structured conditioning program, while being observed by a therapist, will also help you return to sports and other recreational activities that you love. Talk to your doctor or physical therapists about which exercises will be best to help you meet your rehabilitation goals.

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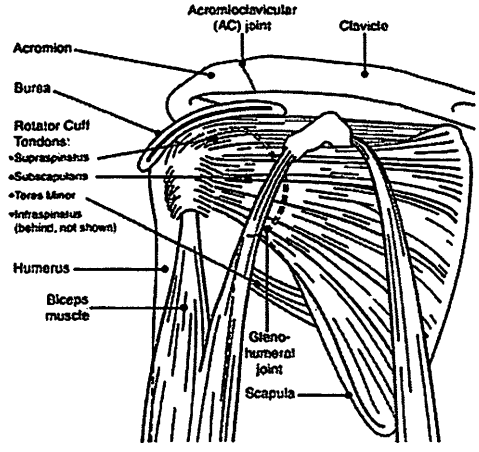
# Prone to Rotator Cuff Injuries and Tears: and the Best Way to Treat These Causes

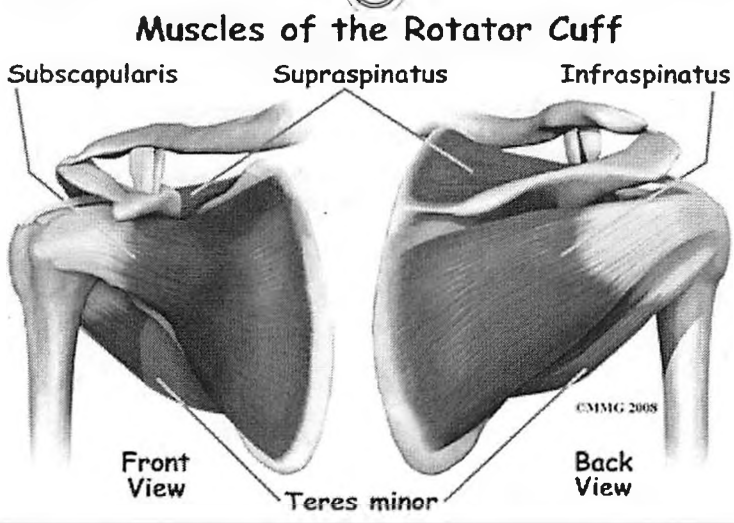
AMY CZUPRYN
SPRING 2012

## Anatomy of the Rotator Cuff

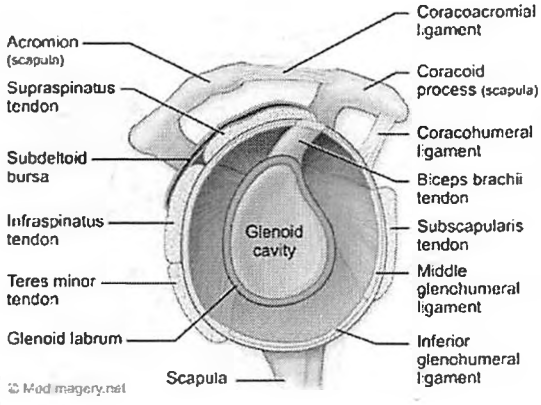
- **Bones:** Clavicle, Humerus & Scapula
- **Ligaments:** Glenohumeral Ligament, Coraco-Acromial Ligament, Coraco-Clavicular Ligament & Transverse Humeral
- **Tendons:** Supraspinatus, Infraspinatus, Subscapularis & Teres Minor
- **Muscles:** Trapezius, Levator Scapulae, Rhomboids, Pectoralis Major & Minor, Latissimus Dorsi, Teres Major, Deltoid, Supraspinatus, Infraspinatus, Subscapularis, Teres Minor
- **Joints:** Glenohumeral Joint, Acromioclavicular (AC) Joint, Sternoclavicular Joint & Scapulothoracic Joint



# Muscles of the Rotator Cuff




# The Glenohumeral Joint

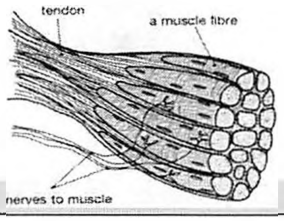



The four muscles of the rotator cuff along with the Glenohumeral Joint provide dynamic stability , which helps to control joint movement during rotation.

The Glenoid Cavity is where the bursa sac is located that allows the arm to freely glide during movement.

## What Can Cause Rotator Cuff Problems?

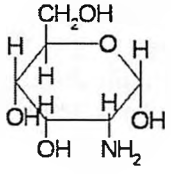
- Injury- while trying to lift or catch a heavy object
- Overuse- after a period of inactivity
- Lack of blood supply to a specific area of the rotator cuff, which tends to occur with increasing age
- Traumatic fall on an outstretched arm
- Shoulder impingement can cause gradual weakening of the tendons
- Degeneration with age



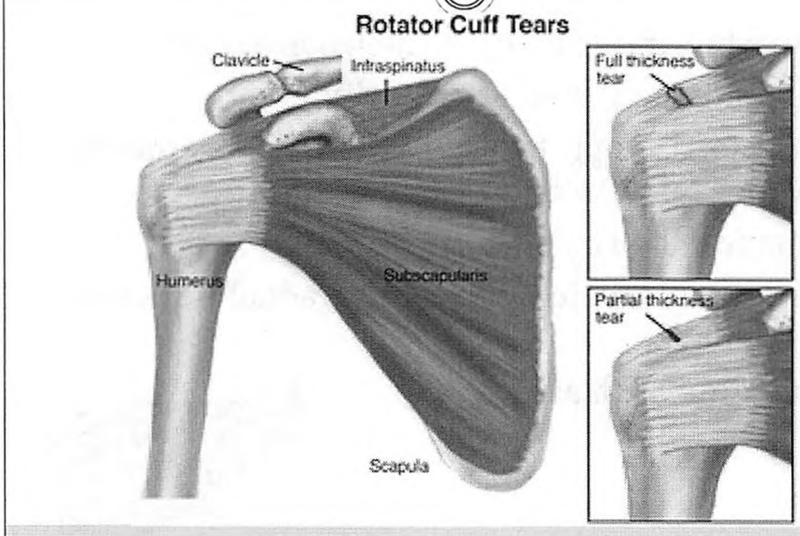

## Glucosamine

Where it is found:

- Cartilage
  - The softer tissue that surrounds the end of your bones between joints and stops them from grinding together.
- Synovial Fluid
  - The lubricating fluid around the joints which cushions movement and impact.
- Tendons
  - Connects muscle to bone
- Ligaments
  - Stretchy elastic connective tissue that hold bones to other bones in the joints.




## Partial Thickness Tear vs. Full Thickness Tear




## Acute vs. Chronic Injury

**Acute Injury:**

- Is a result of a sudden powerful movement
- Symptoms: a sudden tearing feeling in shoulder then followed by a severe pain, limited arm movement because of the pain and or muscle spasm, severe pain, tenderness or an inability to abduct the arm

**Chronic Injury:**

- Develops over a period of time and is due to the tendon lying near the bone and rubbing up against it.
- Symptoms: gradually increasing pain leading to sporadic worsening of pain, pain at night that affects sleeping patterns, atrophy of the muscles causing some weakness, and a crackling feeling when moving the shoulder

Fact from the *American Academy of Orthopaedic Surgeons* (2011), "Most rotator cuff tears are largely caused by the normal wear and tear that goes along with aging - people over 40 are at a greater risk."

## Diagnosis

**To diagnose a tear a doctor can use:**

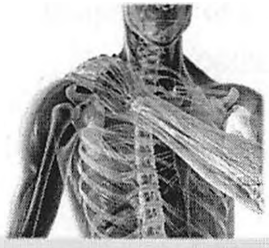
- MRI-
  - Shows the soft tissues of the rotator cuff tendons and the quality of them
  - Doctors can see size of the tear and where it is located
  - Very costly & not accessible to all individuals without taking a trip to the hospital
- Ultrasound-
  - Show some soft tissues and cartilage
  - Less costly & can be done immediately in the doctors office

## Prevention Techniques

- Always carry heavy objects close to body
- Avoid excessive overhead activities
- Use good body mechanics standing straight with your shoulders back
- Avoid unnecessary pressure on the affected shoulder
- Do strengthening exercises for your shoulder
- Do not try to work or play through pain

## Nonsurgical Treatments

- Steroid injections
  - Cortisone
- Strengthening exercises with physical therapy
- Activity modification
- Non-steroid anti-inflammatory medication
  - Ibuprofen
- Plenty of rest



## Surgical Treatments

Three types of Surgical Treatments are:

- Open Repair
  - Used when the tear is large and requires a traditional open surgical incision that is a few centimeters long
- All-Arthroscopic Repair
  - An arthroscope (small camera) is inserted into the shoulder joint to help the doctor guide the surgical instruments
  - Causes a little incision & is the least invasive technique
- Mini Open Repair
  - An arthroscope is used through a small 3-5cm incision
  - This type of repair can also be helpful when trying to fix other damaged structures around the tear

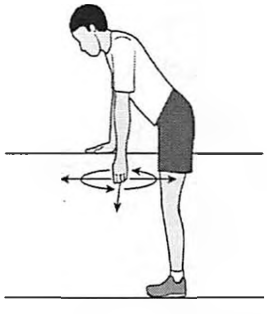
# Rehabilitation

Therapy progresses in three stages:

- Immobilization
  - While the shoulder is healing, keep it stabilized and free from a large amount of movement.
  - 4-6 weeks
- Passive Exercise
  - 4-6 weeks after surgery
  - Gives you minimal range of motion exercises to help improve your range of motion, while the muscle is beginning to be repaired
- Active Exercise
  - 8-12 weeks
  - Progress difficulty of exercises to where you can move your arms on your own and therapist will give you specific strengthening exercises

# Rehabilitation Strengthening Exercises Provided by the AAOS

**Pendulum**



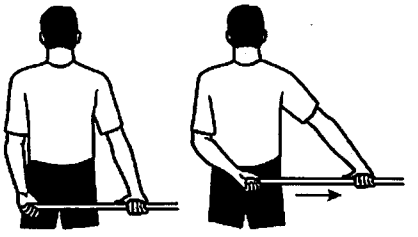
**Repetitions:** 2 sets of 10
**Days per week:** 5 to 6

**Crossover Arm Stretch**

**Repetitions:** 4 each side
**Days per week:** 5 to 6

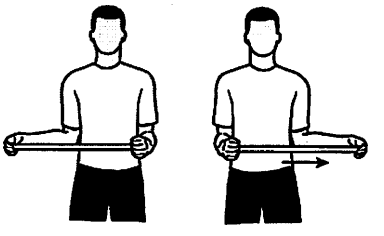
## Rehabilitation Strengthening Exercises Provided by the AAOS

**Passive Internal Rotation**




**Repetitions:** 4 each side
**Days per week:** 5 to 6

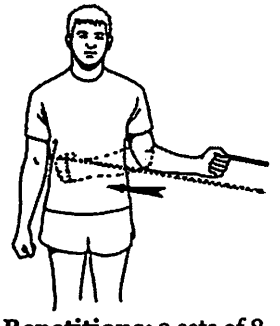
**Passive External Rotation**




**Repetitions:** 4 each side
**Days per week:** 5 to 6

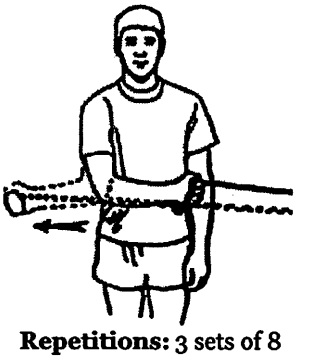
## Rehabilitation Strengthening Exercises Provided by the AAOS

**Internal Rotation**



**Repetitions:** 3 sets of 8
**Days per week:** 3

**External Rotation**



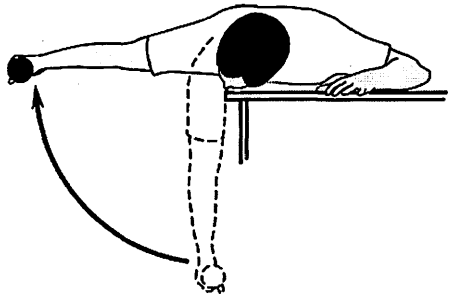
**Repetitions:** 3 sets of 8
**Days per week:** 3

## Rehabilitation Strengthening Exercises Provided by the AAOS

**Scapular Retraction/ Protraction**

**Repetitions:** 2 sets of 10
**Days per week:** 3

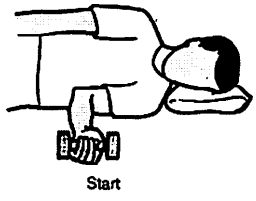
**Bent Over Horizontal Abduction**

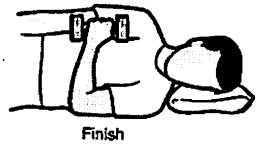


**Repetitions:** 3 sets of 8
**Days per week:** 3

## Rehabilitation Strengthening Exercises Provided by the AAOS

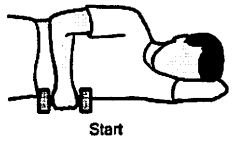
**Internal Rotation**

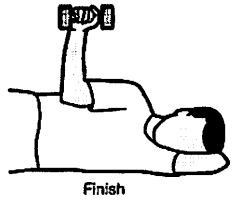



**Repetitions:** 2 sets of 10
**Days per week:** 3

**External Rotation**




**Repetitions:** 2 sets of 10
**Days per week:** 3