TWIN CITIES ORTHOPEDICS

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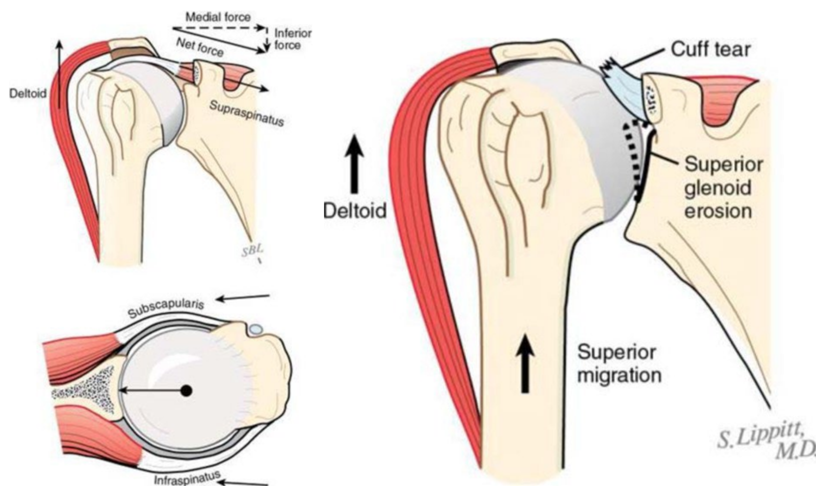
Rotator Cuff

WHAT IS THE ROTATOR CUFF?

The rotator cuff is comprised of 4 muscles with tendons that attach to the humerus: the subscapularis, supraspinatus, infraspinatus, and teres minor. Each of these muscles has an important role in powering the shoulder. The subscapularis is in the front of the shoulder and helps to internally rotate the arm. The supraspinatus is superior and helps to life the arm up. The infraspinatus and teres minor help to externally rotate the arm.

Most importantly, when the rotator cuff is intact, it functions to compress the humeral head into the glenoid concavity (called concavity compression, figure on left[12]). This is important because the shoulder is inherently an unstable joint. When the rotator cuff has been torn, this concavity compression mechanism is lost (figure on right[12]).



WHAT ARE THE NON-SURGICAL OPTIONS FOR ROTATOR CUFF INJURY?

The first option for a rotator cuff injury is to manage the symptoms with a home exercise program or physical therapy, anti-inflammatory medications, or injections. This is especially worth trying for partial thickness tears. Oftentimes, insurance companies will not approve surgery for a partial thickness tear unless physical therapy or a home exercise program has been trialed first. Smaller partial or full thickness rotator cuff tears can possibly do well with physical therapy alone, but a fairly high number of tears will progress in size over time per studies (30-47%).[10,18,24]

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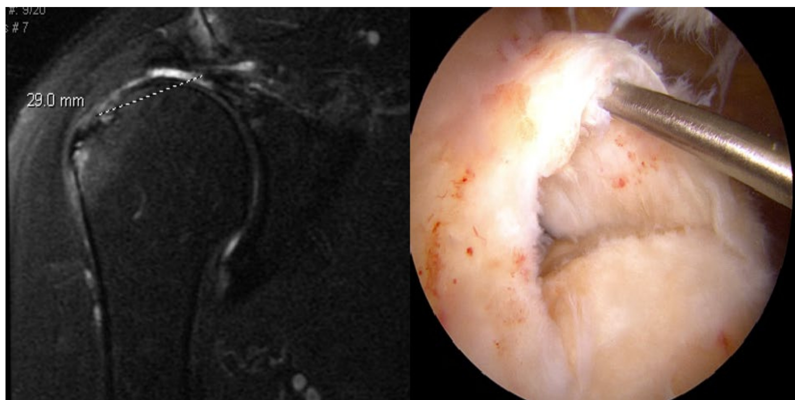
This home exercise program from the American Academy of Orthopaedic Surgeons is a great home exercise program and highly recommended by Dr. LaPrade: https://orthoinfo.aaos.org/en/recovery/rotator-cuff-and-shoulder-conditioning-program/.

Corticosteroid injections can be effective for a short period of time, but there is evidence that they can increase the risk of failure of a later rotator cuff repair.[2] In addition, an injection will delay surgery by at least 3 months to minimize the risk of infection and to maximize healing of the repair.

Dr. LaPrade will generally recommend an MRI prior to any injections if concerned about a rotator cuff tear because if there is a large tear, surgery without a prior injection may be the best course of action. He will discuss the risks and benefits of an injection with each patient. Those with rotator cuff impingement without a tear or a partial thickness tear may experience more benefit with an injection.

WHAT IS A ROTATOR CUFF REPAIR?

A rotator cuff repair is an arthroscopic procedure in which small portal incisions are made to repair the torn rotator cuff back to the humeral bone. Sutures are placed into the torn rotator cuff tendon and anchors are then used to bring the tendon back to its prior location on the humerus. Each tear is different and therefore each rotator cuff repair can be different. This can be done either with a single row of anchors or two rows of anchors (double row).



Studies have shown limited difference clinically between single and double row repairs[8,16] for small tears, although larger tears do show a benefit from a double row repair.[5,8] Biomechanical studies have also favored a double row repair.[22] In general, Dr. LaPrade will perform a double row repair for most large tears and may consider a single row repair for smaller tears.

WHEN IS A ROTATOR CUFF REPAIR RECOMMENDED?

Large rotator cuff tears, especially acute ones that occur after a specific event, such as a fall, are generally recommended for surgery. Studies have reported that a rotator cuff repair generally has better outcomes than those treated nonoperatively, especially for preventing muscle atrophy and improving range of motion and patient outcomes.[7,9] A successful rotator cuff repair can help to decrease pain, restore motion, and ultimately hopefully help avoid rotator cuff arthropathy.

WHAT IS THE RETEAR RATE FOR ROTATOR CUFF REPAIR?

Unfortunately, studies have shown that the retear rate after rotator cuff repair is not low. Studies have reported the retear rate anywhere from 16% to 65%.[11,14] However, it does appear that even if rotator cuff tears fail to completely heal after rotator cuff repair that many patients still do quite well.[13,15] The patients who likely will have the most symptoms are those with labor-intensive occupations. If there is a retear after a first repair, another arthroscopic procedure may still be an option.

WHEN IS A ROTATOR CUFF REPAIR NOT RECOMMENDED?

There are certain patient factors that can increase the likelihood of failure after a rotator cuff repair. Usually, this is because a tear is very large and retracted or the tear is chronic and been present for many years. The retear rate in those with atrophy of the rotator cuff muscle, which can happen after large or chronic tears, can be up to 78%.[21]

A superior capsular reconstruction (SCR) can be an option in some patients for which a rotator cuff repair is not recommended due to muscle atrophy. In addition, for a SCR, the patient cannot have rotator cuff arthropathy. An SCR can be done with either a cadaver allograft or using a patient’s own biceps tendon. Of note, there is evidence that a SCR is likely better able to help with pain and range of motion, with less improvement with muscle strength or return-to- sport. SCR has also been found to have a fairly high rate of graft failure and progression to arthritis.[4] Dr. LaPrade will discuss the option for SCR with patients if they fit the fairly limited indications, but he does believe it can have a role for some patients.

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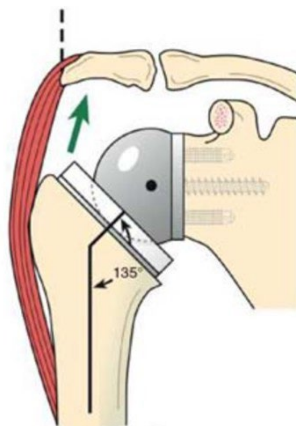
Additionally, someone who is an active smoker is likely not a great candidate for a rotator cuff repair. Studies have reported a 2 to 3.5x higher rate of failure in smokers.[3,26] Generally, it would be recommended to quit smoking for at least 3 months prior to a rotator cuff repair for optimal results.

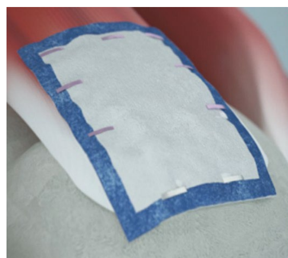
If there is rotator cuff arthropathy, a reverse total shoulder is usually the best surgical option, and it works because it changes the center of rotation of the shoulder to leverage the deltoid muscle to power the arm in the absence of the rotator cuff.[12] This is described in more detail in the shoulder arthritis patient handout.



WHAT IS A ROTATOR CUFF COLLAGEN PATCH?

A rotator cuff collagen patch has been designed to function as a possible alternative or adjunct to a traditional rotator cuff repair. The patch is made of bovine collagen and stimulates the patient's own cells to increase healing and thickness of the injured tendon.[19] It is still very new, but this patch has promising results in increasing the thickness of the rotator cuff tendon or decreasing failure after a repair.[19,23] Studies have shown that patients require immediate physical therapy to avoid the stiffness that results from the inflammation/healing stimulated by the patch.[25]

Dr. LaPrade currently would consider using a patch for partial thickness tears that have failed physical therapy or for revision ("redo") rotator cuff repairs, although as more studies come out, he may expand these indications.



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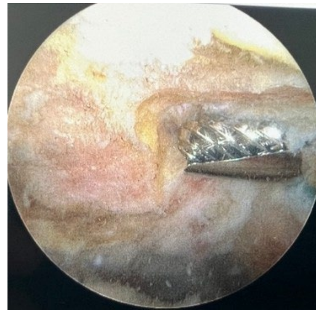
WHAT OTHER PROCEDURES MAY BE PERFORMED WITH A ROTATOR CUFF REPAIR?

Rotator cuff repairs oftentimes are performed in combination with other procedures in the shoulder. Oftentimes there are other injuries or wear and tear in the shoulder. A debridement of any loose cartilage, labrum, rotator cuff or other injured structures in the shoulder will be performed if necessary to clean up the shoulder. A capsular release will often be performed, especially if the patient is stiff when examined while asleep. This can help decrease stiffness after surgery.

A subacromial decompression ("shaving the bone spur") involves gently shaving the undersurface of the acromion to create more space for the rotator cuff after surgery and cleaning up any bursitis/inflammation in the subacromial space. Dr. LaPrade will almost always do a subacromial decompression.



A biceps tenodesis or tenotomy may be performed if there is significant tearing or inflammation of the long head of the biceps tendon or superior labrum (SLAP). The biceps tendon is thought to be a possible pain generator in the shoulder joint due to it having many nerve fibers near its attachment. A tenodesis involves cutting the biceps tendon and reattaching the tendon to a different location to maintain the normal tension on the biceps muscle (figure below). A tenotomy is simply detaching the biceps, and it has been shown to have no major clinical drawback besides a cosmetic difference ("popeye's" deformity).[6]

Dr. LaPrade will make the decision on whether a biceps tenodesis or tenotomy is indicated based on the appearance of the biceps and SLAP during surgery. He will typically do an arthroscopic biceps tenodesis over a tenotomy; occasionally, he will do an open biceps tenodesis if needed. Some patients will have an old biceps injury and Dr. LaPrade will not recommend fixing these as usually these are minimally symptomatic and often will require a large open incision to safely find the tendon.

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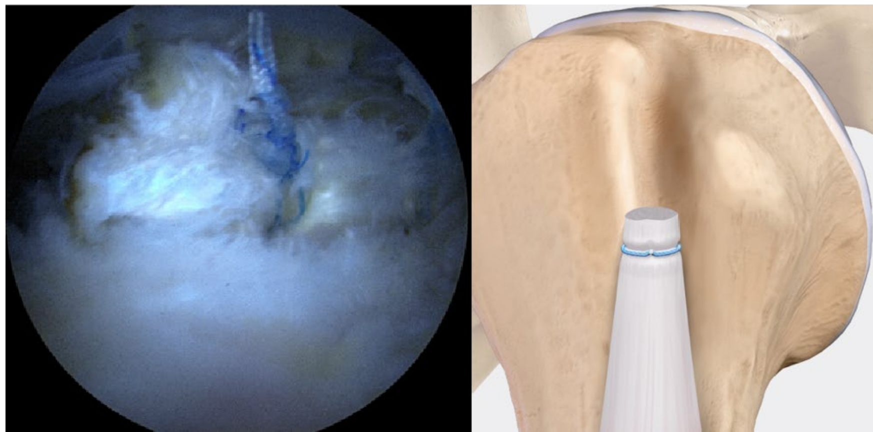
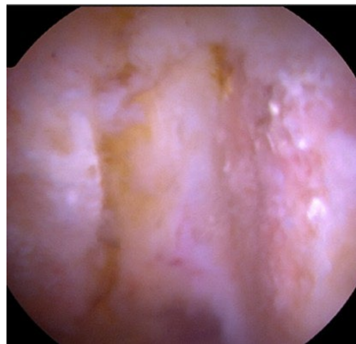


Lastly, a distal clavicle resection will be performed if there is significant pain in the AC joint prior to surgery. Dr. LaPrade will examine the AC joint in clinic as the MRI will often make the AC joint appear much worse than a patient's symptoms.[17] This can be done open or arthroscopic, with arthroscopic the preferred option for most patients.



WHAT IS THE RECOVERY PROCESS FOR A ROTATOR CUFF REPAIR?

The recovery process from a rotator cuff is admittedly long. Patients are typically in a sling for 6 weeks (sometimes up to 8 for a massive tear) but working on physical therapy for passive motion soon after surgery. They can begin actively moving their arm at 6-8 weeks. Usually around 4-5 months, all restrictions are removed and patients can work towards returning to normal activities. Please see Dr. LaPrade's website for full PT protocols for a normal rotator cuff repair and a massive rotator cuff repair: https://tcomn.com/physicians/christopher-laprade/.

Studies have shown that patients that have more early stiffness usually end up having less chance at a rotator cuff retear, and by 6 months do not have any decrease in motion.[1,20] Therefore, it appears that while the stiffness for some patients can be frustrating, it likely is indicating that the body is healing the rotator cuff tear. This is especially important for a massive tear.

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