Patient Guide to Superior and Anterior-Superior Migration of the Shoulder

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What is superior migration of the shoulder?

This is a somewhat rare condition of the shoulder seen in two groups of patients. The first group of patients are those with large rotator cuff tears where one or more of the tendons is completely missing. Sometimes patients in this group have had an operation to repair the tendons but the repair has failed. The second group of patients are those who have had a shoulder replacement where the rotator cuff tendons have failed to hold or where the tendons were not present to begin with.

What exactly is "migration"?

The shoulder is a ball and socket joint (Figure 1). The ball is the humeral head which is at the end of the humerus or arm bone. The socket is part of the shoulder blade and is flat. The ball is much larger than the socket, and some say that a good analogy is that the humeral head on the socket like "a beach ball on a dinner plate".

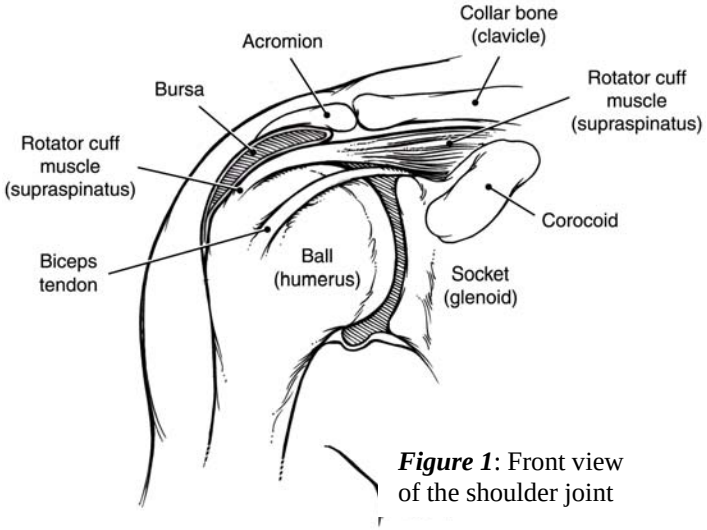

Figure 1: Front view of the shoulder joint

The ball is held into the socket by several things, including the muscles, the ligaments, the labrum and the rotator cuff (*Figure 1*) . The ligaments are like ropes that go from the socket to the ball and are essentially tethers that keep the ball from rolling out out of the socket (i.e. keep the ball on the dinner plate). The rotator cuff muscles begin on the shoulder blade and as they get close to the joint they turn into tendons. These tendons in turn attach around the ball, forming a cuff of tendons in the front, back and top of the ball (See "Patient Guide to the Rotator Cuff"). When the muscle contracts, it pulls on the tendon which in turn pulls on the bone, causing it to move. When the arm moves, the ball rotates on the socket as the arm is rotated or lifted up. For the arm to move, the ball has to be in a position which is nearly in the middle of the socket (*Figure 2*). The center of the ball stays fairly close to the center of the socket in the normal situation. If the ball does not stay in the center of the socket, the ball does not rotate correctly and the arm does not move as well. When the ball is not completely in the center of the socket, it is called "migration." Another word for this is "subluxation,". It is important to realize that the shoulder is not unstable (i.e. the ball is not dislocatig entirely out of the socket), but that the ball is moving out of the center of the socket enough to effect motion.

What is "superior" migration?

In the normal situation, the ball is kept in the center of the socket by the ligaments and rotator cuff tendons. There are four rotator cuff tendons: one in the front of the ball (the subscapularis muscle and tendon), one larger in the back of the shoulder (the infraspinatus muscle and tendon), one smaller in the back of the shoulder (the teres minor muscle and tendon), and one on the top of the shoulder (the supraspinatus muscle and tendon) (See the patient guide to rotator cuff problem). The rotator cuff muscle one in the front (the subscpularis) mostly moves your arm toward the front, like scratching your stomach. The ones in the back (infraspinatus and teres minor)moves your arm to the side like reaching out to the side for a glass or cup. The one on the top moves your arm up, like reaching into the cabinet. The one that is most commonly torn is the one that is on the top of the shoulder (namely, the supraspinatus). Sometimes that tendon is torn such that it cannot be repaired.

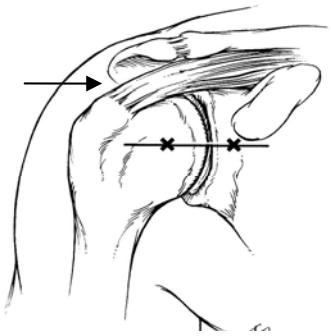

Figure 2: In this view, you are looking at the shoulder from the front. In the normal shoulder, the center of the humeral head should line up with the center of the socket. There is a large space between the ball and the acromion (arrow).

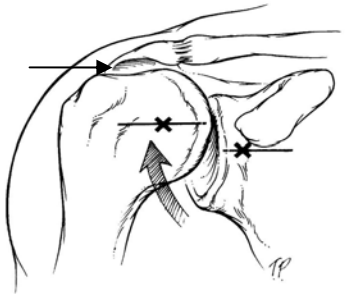

Figure 3: When the supraspinatus tendon is gone or torn, the humeral head migrates or "subluxes" superiorly in relation to the socket. The center of the ball is no longer in the center of the socket. The space between the ball and the acromion becomes smaller (arrow).

The supraspinatus tendon is actually a large tendon. It is about as thick as your little finger and as wide as your middle three fingers. In the shoulder it is located between the ball of the arm bone (humerus) and a part of the shoulder blade called the acromion (*Figure 1 and 2*). It acts as a spacer between the acromion bone and the humeral head. When it becomes thin or torn, then the space between the humeral head and acromion becomes smaller. This space goes from around one centimeter (half an inch) to no space at all. This means that there is nothing to keep the humeral head from riding up onto the under surface of the acromion. When this happens the ball of the humerus no longer sits in the center of the socket (*Figure 3*). It is analogous to moving a ball bearing out of its casing so that it is not in the center. This migration of the humeral head upward is also called a "superior subluxation" because the ball is not in its proper position ("subluxed"). (See Patient Guide to Shoulder Instability).

In some individuals the humeral head may not only migrate upward, it may migrate toward the front of the shoulder (called "anterior" migration or subluxation) as well. In this situation the ball not only moves upward abnormally in the socket, it will also move too far forward. When the head moves in this direction it is called "anterior-superior" migration (*Figure 4a and 4b*).

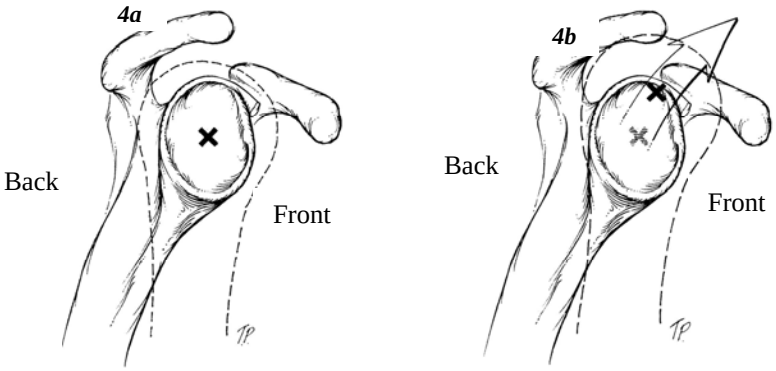

Figure 4a and 4b: In this drawing, you are looking at the shoulder from the side. The dotted line represents the arm bone (humerus). In the normal situation, the ball line up with the center of the socket (4a). With superior subluxation there can be anterior subluxation where the center of the humeral head also moves anterior and forward on the socket (4b).

What are the signs or symptoms of this superior or anterior-superior migration?

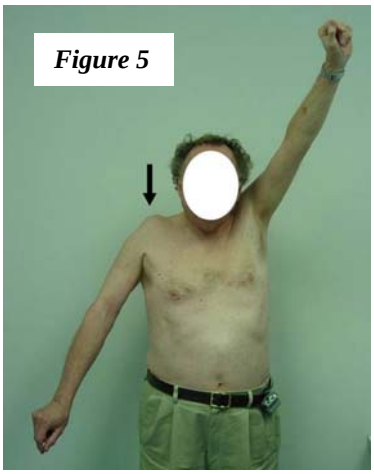
Figure 5

What this means for the shoulder joint is that when the muscles go to pull on the arm, the ball becomes trapped in the top of the socket. The ball cannot rotate correctly and the muscles are not strong enough to pull the arm up. One of the main signs of superior subluxation is that the arm loses its motion. When a person with this condition goes to lift their arm, they can only raise it about one third of the way up or around sixty to seventy degrees (*Figure 5*). In shoulders with anterior-superior subluxation you may actually see a prominence on the front of the shoulder as the ball rides up and forward (arrow).

This inability to raise the arm is the reason that this condition limits a person's ability to use the arm. This loss of ability to lift the arm over the level of one's shoulder makes it difficult to reach into cabinets or to the back of the head.

The second symptom of this problem can be pain. Not everyone with this condition has pain, and the reason one person gets pain and another does not get pain is not fully known. The pain is typically in the shoulder area although it may be felt into the arm or in the middle of the arm. The pain often is related to how much one tries to use the shoulder, particularly if a person tries to lift heavy objects or lift over shoulder height. Some individuals can have arthritis (loss of cartilage on the ball or socket) that contributes to the pain. It is not known why some individuals with this condition get arthritis and some do not.

How is this condition diagnosed?

This condition can be diagnosed by your physician based upon your history, physical examination and radiographs (X-rays). Some but not all patients with this condition will have a history of an injury to the rotator cuff. This condition is common in patients who have had surgery for large tears of the rotator cuff that have failed to heal or failed to stay repaired.

The examination often will give clues that the person has this condition. There may be loss of motion, particularly in elevation when trying to reach above shoulder or head level. There may be loss of some rotation, such as up the back or when trying to reach behind the head. There often is weakness with these same motions. There should not be tingling or numbness or weakness in the hand or elbow muscles, and if these are present, then consideration of nerve injuries or pinched nerves should be considered.

Radiographs or regular X-rays can sometimes be helpful in making the diagnosis, and they should usually be done first before any other studies are performed. Plain X-rays tell you whether other conditions exist, and they may give some evidence that arthritis exists. In this condition the X-ray will often show that the humeral head is riding too high, and that the distance between the acromion and humeral head is very narrow. These findings confirm this condition and these findings are considered diagnostic of this condition.

Sometimes the diagnosis is made using magnetic resonance imaging (MRI). In some patients, plain radiographs do not demonstrate that the humeral head is riding high in the socket. An MRI can give more information about which rotator cuff tendons are torn and how badly they are torn. An MRI can also tell if the rotator cuff muscles have undergone atrophy or shrinkage from prolonged tendon damage.

How is this condition treated?

What is done for this condition depends upon whether the problem is loss of motion or pain, or both. The treatment is individualized for each patient depending upon the exact complaints.

If the problem is pain, then what is done depends upon the severity of the pain and when it occurs. There are some things that people with this condition cannot do, and when they do them, it causes pain. One strategy is to

just avoid those activities, particularly heavy lifting or trying to carry heavy objects away from the body. Another way to treat the pain is with ice or heat, which ever makes the pain better. We typically recommend ice packs if the shoulder is sore, or they can be used prior to bedtime to help one sleep better (see Patient Guide to Ice Techniques). The use of arthritis medicines can be helpful whether arthritis is present or not. These medications include aspirin, ibuprofen, naprosyn, celebrex, and others. You should consult with your physician prior to using these medications. If the problem is pain at night, it is helpful to take one of these medications to in the evening prior to bedtime or with the evening meal. Lastly, pain medications such as acetamenophen or even narcotic medications can be helpful. The intermittent use of narcotics for this condition is permissible, but it should be discussed with your physician. For people with severe pain with this condition for which there is no other solution to the pain, consultation with a pain expert is recommended.

Physical therapy can be helpful to help range of motion and strength. It is very important to not allow the shoulder to get stiff with this condition. Stiffness tends to increase the pain and loss of function in people with this condition. We recommend five minutes of stretching every day to prevent any further loss of motion. A physical therapist or other health professional who knows these basic shoulder stretching exercises should be consulted. Strengthening can be done to keep the muscle about the shoulder in good shape, and it is recommended that light strengthening be done two to three times a week. It is very important not to over do it with the exercise to the point of pain, and if the exercises are causing you pain, then you should consult with a physical therapist to review the exercises.

Cortisone shots can be given for this condition but it is not recommended unless there are some exceptional circumstances. It has become appreciated that while cortisone shots help with pain and decrease inflammation, multiple cortisone shots will eventually lead to further damage to the cartilage. Multiple cortisone shots over time into the joint can actually make the arthritis worse. As a result, cortisone shots for the occasional severe flair up of pain can be given, but the side effects and risks should be discussed with your physician.

Occasionally patients can have a positive response to dietary supplements such as glucosamine. About fifty percent of people who take glucosamine or supplements like it get some relief of arthritis pain. Unfortunately there is no evidence that these supplements heal or regenerate cartilage. Also, they must be taken everyday and the effect wears off if they are stopped. The expense should be considered also since they must be taken everyday. We recommend these only if the other therapies mentioned above have failed.

When is surgery indicated for this condition?

Surgery for this condition is indicated when the above measure fail to bring relief. What kind of surgery is contemplated depends upon the problem experienced by the individual patient. If the problem is pain, then there are certain choices. If the problem is loss of motion, then there are other choices. If the problem is both, then other options are considered. It is important that the goals of the operation be clear to the patient and to the doctor.

If the problem is pain alone, the most important issue is how much arthritis is present. One procedure that can be done if there is not too much activities is arthroscopy of the shoulder with trimming of the bursa and inflamed tissue in the shoulder (called an arthroscopic “debridement”) (see Patient Guide to Shoulder Arthroscopy). In this procedure done in the operating room the arthroscope and other instruments are used to clean out the tissues in the shoulder believed to be inflamed and irritated. This is usually done as outpatient or “same day” surgery. This procedure has several advantages. First, there is very little blood loss and the recovery is fairly rapid. Second, at the time of the arthroscopy the joint can be examined for arthritis or other cause of the pain. This procedure may give some temporary relief for months or perhaps a couple years in some patients. Unfortunately it is very unpredictable and while some patients experience excellent pain relief, some patients get little relief at all. This is because it does not solve the underlying problem, which is loss of the rotator cuff tendons and migration or subluxation of the humeral head on the socket. While initial enthusiasm for this type of treatment was high, experience has shown us that only half to 70% of patients who have this treatment get any pain relief. There are few studies in the scientific literature on this subject, and each physician will have an opinion about the success of this operation. In each person’s case, the risks of the anesthesia and the operation have to be balanced against the possibility of no or limited relief. For some patients it will be worth the risk and it will be an excellent option short of having the shoulder replaced.

Another operation that is available for pain relief is a muscle transfer. The idea behind a muscle transfer is to take another muscle around the shoulder and surgically release its tendon from bone and move it to the shoulder joint area. The tendon is sewn or sutured to the top of the humeral head on the ball so that it acts as a buffer between the humeral head and the acromion. It is also hoped that the tendon may help improve motion by putting it in a spot where the muscle action can help the humeral head rotate better. There are several possible muscles that can be transferred for this problem, but the most commonly utilized muscle is the latissimus dorsi muscle. It is a muscle in the back of the shoulder and the tendon is moved from there to the top of the humeral head (see Patient Guide to Latissimus dorsi transfers). This operation seems to be better at providing pain relief than it does for regaining motion or function, but most patients see same improved motion. Scientific studies on this procedure suggest that this operation is successful for pain relief in 80 to 90% of patients.

If there is a lot of arthritis, then the one surgical procedure that can be done is a shoulder replacement (see Patient Guide to Shoulder Replacements). In this situation, the humeral portion or ball of the humerus is replaced but not the socket. Pain relief with this operation is good and most patients have satisfactory relief of pain so that they can sleep and do most activities without pain. Once the pain is gone, some patients see improvement with range of motion and function, but unfortunately this is unpredictable. It cannot be assured that there will be any improvement with motion or function, so shoulder replacement should be done primarily for pain relief. Also, this operation is not perfect and some patients may have pain if they do too much once their shoulder has healed from the surgery. This is something that should be carefully discussed with your physician since you should have realistic expectations for what this procedure can and cannot do for your shoulder.

The last operation for pain is a new type of shoulder replacement called the “Reverse Prosthesis” or “Delta Prosthesis” (See patient guide to reverse prosthesis). It was designed by shoulder surgeons in France and has been used in Europe since 1993. It was released in the United States in 2004 after FDA approval. This procedure provides excellent pain relief and can improve range of motion. The ideal patient for a reverse prosthesis has arthritis due to rotator cuff tendons. This prosthesis can be use in patients with anterior-superior subluxation without arthritis. However, when use for this situation, the patient must realize that the degree of improvement in range of motion cannot be quaranteed. This prosthesis provides great hope for patients with anterior-superior subluxation.

Are there any operations to help regain my motion?

The answer to this question is difficult. For patients with superior or anterior-superior subluxation, the most difficult part to solve with surgery is the loss of motion and function. This is because there is currently no way to replace the missing rotator cuff tendons. While muscle transfers provide some substitution of the rotator cuff tendons, they do not exactly reproduce the function of the rotator cuff muscles and tendons. Another difficulty is finding a way to get the ball centered back into the joint. As a result, while there are surgical options available now, all of the surgical options are imperfect at returning normal motion and function.

The muscle transfers mentioned above can sometimes provide improvements in motion and function. The results depend upon what muscle is transferred and upon the status of the shoulder itself. Not every patient is a candidate for these operations, particularly if more than one rotator cuff tendon is torn. Each case is different and you should discuss the factors with your physician.

The other option is the Reverse Prosthesis (See patient guide for reverse prosthesis). Early reports suggest that it is successful at restoring motion in a majority of patients, and some of the improvement in motion may be due to its effect of reducing pain in the shoulder. Long term results are currently not available, so it is not known if the reverse prosthesis replacements will survive the test of time. The surgical risks must be balanced by the uncertainty of the results by every patient and surgeon.

What is in the future for solving this problem?

The problem of superior and anterior-superior subluxation is one of the most challanging problems faced by shoulder surgeons today. There are several important avenues currently being explored for solving these problems. The first is to find ways to replace or “engineer’ tendons that would restore function to the rotator cuff muscles. This technology of using cells or scaffolds or other tissues is in its infancy and it will take several more years of exploration and discovery.

There also may be available in the future other shoulder joint replacements for this problem, but these too are under development and are not on the market yet. Development and testing of these prosthesis takes years and they should be critically examined before they can be used in humans.

For more information call the office of Edward G McFarland, M.D. at 410-583-2850
or visit the website: http://www.hopkinsortho.org/patient_guides.html