
IMPINGEMENT SYNDROME

If you experience impingement syndrome in your shoulder, the bones and tissue in your upper arm are improperly aligned – narrowing the space between the acromion and the rotator cuff. It is often a precondition for many common shoulder ailments, including bursitis, tendinitis, arthritis, as well as injuries to the rotator cuff tendons. One of the common signs of impingement syndrome is discomfort when you raise your arm above your head.

The normal shoulder joint is a very elegant, complex machine – it has the most mobility of any joint in the body. The ball and socket design of the shoulder allows the arm to rotate, enabling us to reach and swing our arms, hit or pitch a baseball, use a tennis racket, wash our hair, and lift and carry a child. It is because of this flexible design that we are able to use our hands and arms in many so different positions.

The design of the shoulder joint gives it great range of motion but limited stability. It is prone to injury as we age. As long as the parts of this elegant machine are in good working order, the shoulder can move painlessly and easily. When injury or conditions such as impingement syndrome, tendinitis, or bursitis affect the shoulder joint, pain and the loss of mobility result. Because we depend on flexible arm movement for so many of the activities that are important and pleasurable to us, injuries to the shoulder joint can be very disruptive.

To understand impingement syndrome, it is important to know something about the anatomy of the shoulder. Anatomically, the shoulder is like a cup and saucer. The cup is the head of the humerus (arm bone), and the saucer is the glenoid socket of the scapula, or shoulder blade. The tendons of four muscles form the rotator cuff, blending together to help stabilize the shoulder. The fibers of the rotator cuff bend as the shoulder changes position.

Tendons attach muscles to bone and are the mechanism enabling muscles to move bones. It is because of the rotator cuff tendons, which connect the long bone of the arm (the humerus) to the scapula (the shoulder blade) that we can raise and rotate our arms. The rotator cuff also keeps the humerus tightly in the socket (glenoid) when the arm is raised. For normal function, each muscle must be healthy, securely attached, coordinated, and conditioned.

Another important structure within the shoulder joint is the bursa, or lubricated sac of synovial fluid that protects the muscles and tendons as they move against each other. There is a bursa between the part of the scapula that makes up the roof of the shoulder (known as the acromion) and the rotator cuff tendons. The bursa simply allows the moving parts to slide against one another without too much friction.

Causes of Impingement Syndrome

People who continuously work with arms raised overhead, or who engage in repetitious throwing activities, are especially vulnerable to this condition. Activities requiring overhead reaching put particular pressure on the rotator cuff tendons, and any form of repetitive movement, chronic misuse, or recurring stress may result in impingement.

When the space between the humerus and the acromion above it is narrowed, the four rotator cuff tendons, the cartilage on the ends of the bone, and the bursa are all impinged upon, or squeezed. This results in one or more forms of inflammation of the joint. Bursitis, tendinitis, and arthritis, are all inflammatory conditions closely related to impingement syndrome, often occurring in combination with it. Impingement syndrome also contributes to the tearing of rotator cuff tendons, as it weakens the rotator cuff and makes it more susceptible to injury.

Another problem that may contribute to impingement is the development of bone spurs. Bone spurs can further reduce the space available for the rotator cuff and cause wear and tear of the *acromioclavicular (AC) joint* between the collarbone and the shoulder blade. This joint sits directly above the bursa, and any bone spurs developing beneath it irritate the bursa, making impingement worse.

Symptoms of Impingement Syndrome

To some degree, impingement occurs in everyone's shoulder as the result of daily activities we do that use the arm above shoulder level. But people who continuously work with arms raised overhead, or who engage in repetitious throwing activities, are more vulnerable to this condition. They may become aware of a generalized aching sensation in the shoulder, or pain when raising the arm out from the side or in front of the body.

Most people with impingement syndrome complain of difficulty sleeping when they roll over onto the affected arm. A sharp pain when trying to reach into a back pocket is also a very reliable indication of impingement. As time goes on, discomfort increases and the joint may become stiffer. There may be a "catching sensation" when the arm is lowered. If the arm is so weak that you are unable to lift it on your own, the rotator cuff tendons have probably been torn.

Impingement syndrome usually results in the slow onset of pain and discomfort in the upper shoulder, especially when the arm is raised. If tendinitis or bursitis develop, there may also be pain when the arm is lifted away from the body. Sometimes tendinitis develops in the biceps tendon, the tendon located in the front of the shoulder that helps bend the elbow and turn the forearm. If so, pain may travel to the front of the arm and down the forearm.

Treatment of Impingement Syndrome

In diagnosing impingement syndrome, your doctor will ask about your medical history and any other previous or persistent conditions of the arm and shoulder. He or she will inquire about your activities and occupation, as they usually play a major role in the onset of impingement. A complete and competent exam involves considering the possibility of associated injuries or conditions such as tendinitis, bursitis, arthritis, and rotator cuff tears.

X-rays may be taken to examine the site for bony abnormalities or evidence of arthritis. Some people have an unusual anatomy of the acromion, in which the bone tilts too far down and reduces the space between it and the rotator cuff. X-rays will indicate this, and will also reveal any bone spurs in the acromioclavicular (AC) joint. If the shoulder is noticeably swollen, your doctor may aspirate the joint, testing the withdrawn fluid for infection.

A test called an *arthrogram* may be used if your physician suspects a tear of the rotator cuff tendons. For this test, dye is injected into the shoulder joint before x-rays are taken. If dye leaks out of the place where it was injected into the joint, there is likely to be a rotator cuff tear at that location. An *MRI scan* is another special test, involving the use of magnetic waves to create pictures that look like slices of the shoulder. The MRI scan can also show whether there has been a tear in the tendons. Sometimes ultrasound is used to examine the shoulder joint.

Another common test for impingement involves the injection of a small amount of local anesthetic (such as novocaine or lidocaine hydrochloride) into the space under the acromion. This test helps eliminate the possibility that the pain results from a problem in the neck. If pain subsides immediately after injection, impingement syndrome is likely to be the cause of discomfort.

The first step in treating impingement syndrome and its related conditions is to reduce pain and inflammation. The commonly preferred treatment protocol involves rest, ice, and over-the-counter anti-inflammatory medication such as aspirin, naproxen, or ibuprofen.

Your doctor will also want to see how well your shoulder responds to physical therapy. In some cases the doctor or therapist will use the gentle sound-wave vibrations of ultrasound to warm deep tissues and promote the flow of blood to the shoulder tissue. As pain subsides, you will be asked to try specific stretching and strengthening exercises. These are often preceded and followed by use of therapeutic ice.

If these treatment methods do not offer significant improvement, your doctor may inject a corticosteroid medicine into the space under the acromion. Steroid injections are a common treatment that nevertheless must be used with caution because they occasionally lead to tendon rupture. For this reason, and because steroids are associated with other side effects over time, they do not represent the best long-term solution to impingement syndrome or other persistent shoulder injuries.

Surgical Treatment for Impingement Syndrome

Surgical intervention is usually recommended if there is still no significant improvement after 6 to 12 months of conservative treatment. Contemporary surgical methods include either arthroscopy or open surgery, or sometimes a combination of the two. Either form of surgery can repair damage and relieve impingement pressure on the tendons and bursa.

When surgery becomes necessary, the major goal is to increase the space between the acromion and the rotator cuff tendons. The first thing the surgeon will do is to remove any bone spurs under the acromion that chafe the rotator cuff tendons and the bursa. In most cases a small part of the acromion will be removed as well, to give the tendons more space and enable them to move without rubbing on the underside of the acromion. People who have an abnormal tilt to the acromion will probably need to have more of the bone removed.

Surgery for impingement syndrome offers an opportunity to correct other related conditions as well. If there is degenerative (wear and tear) arthritis in the acromioclavicular (AC) joint in addition to impingement, the end of the clavicle may be removed. This procedure is called a *resection arthroplasty*. After about one inch of the clavicle has been cut away, scar tissue fills the space left between the clavicle and the acromion to form a false joint. This usually puts an end to arthritic pain in the acromioclavicular (AC) joint, as the scar tissue forms a stable, flexible connection between the clavicle and the scapula.

Today, arthroscopy is frequently used for the surgical procedure. One or two small incisions are made on the shoulder, but repair in the joint itself is done with an arthroscope, a fiberoptic telescope. Pencil-sized instruments containing a small lens and lighting system magnify and illuminate the structures inside the joint. The arthroscope is inserted into the joint and attached to a miniature television camera, allowing a magnified view of spaces in the joint that would otherwise be inaccessible. This technology makes possible very precise treatment of specific parts of an injury, using a laser to cut away damaged tissue. One advantage of arthroscopy is that you can often go home the same day.

The orthopedic surgeon, who takes into account the many factors that go into each individual case, determines the surgical method used. Sometimes open incision is preferred to arthroscopy. In these cases, a cut of about 3 or 4 inches is made over the top of the shoulder and the same procedures are followed in repairing the joint. Open surgery usually requires that you stay overnight in the hospital.

After surgery, your arm will be protected with a sling, an immobilizer, or a splint or cast. In most cases your shoulder therapist will begin working with you the morning after your surgery, showing you how to do simple exercises to help prevent stiffness and swelling. Even if the shoulder itself is not exercised right way, it is important to gently move your fingers, hands, and elbow -- this controls swelling and helps prevent stiffness. You will be asked to refrain from lifting anything at first, as this may strain the muscles as they heal.

If your doctor has prescribed a sling, you should remove it only at those times during the day when you perform home exercises advised by the physical therapist. Exercising the joint is critical to prevent a stiff or "frozen" shoulder. The use of ice, which decreases the size of blood vessels in the sore area, helps prevent inflammation.

Your physical therapist will work with you to develop strength in the tendons of the rotator cuff. Stabilizing and strengthening the muscles of the shoulder through the consistent practice of a series of exercises decreases the possibility of impingement or other related conditions returning to the shoulder or upper arm.

Possible Complications of Surgery for Impingement Syndrome

Although surgery for impingement syndrome is usually without any significant problems, there may occasionally be unforeseen complications associated with anesthesia, including respiratory or cardiac malfunction. The surgery itself may be complicated by infection, injury to nerves and blood vessels, fracture, weakness, stiffness or instability of the joint, pain, or the need for additional surgeries.

Improvement to the shoulder is determined not only by surgery but also by your general condition and rehabilitative effort. In many cases, the tendons and muscles of the shoulder have been weakened from prolonged misuse or degeneration, and strengthening them will require a gentle, steady process of changing habitual ways of moving your arm.

Keeping in mind that it is likely to be several months before you achieve maximal results, you can almost always look forward to a more mobile, pain-free joint. Taking care of impingement syndrome also means you are less likely to be subject to chronic bouts of impairment from related conditions such as bursitis, arthritis, or tendinitis.