

Patient Guide to Ream and Run Shoulder Surgery



THE
KNEE • HIP • SHOULDER
CENTER

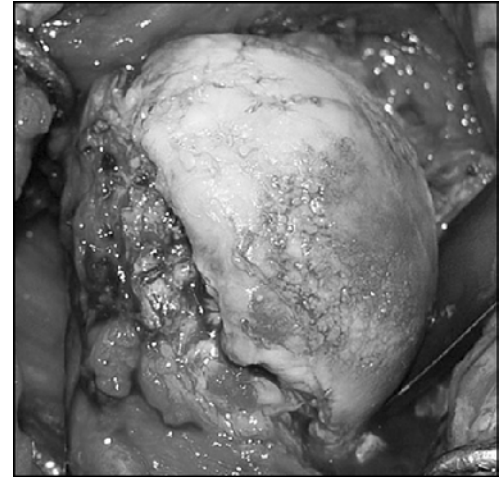


333 Borthwick Avenue, Suite 301
Portsmouth, NH 03801
Ph: 603-431-5858; Fx: 603-431-5818
avatar@kneehipsho.com

Summary:

The shoulder is a ball and socket joint that allows the arm to be placed in an incredibly wide range of positions during every day activities. The ball is formed by the head of the humerus (arm bone), and the socket is formed by the scapula (shoulder blade). The socket is also referred to as the glenoid. The surfaces of the ball and socket are formed by cartilage, a tissue that allows joints to glide in a smooth and frictionless way. The rotator cuff muscles and tendons attach around the margins of the ball and act both to stabilize the shoulder and elevate and rotate the arm.

Arthritis of the shoulder is a condition in which the cartilage on the humeral head and glenoid progressively deteriorates. As this process becomes more advanced, the joint surfaces become rough, and areas of bone may be exposed. Bone spurs form around the margin of the ball and the ball may begin to flatten and become misshapen. The figure to the right shows the surface of a humeral head destroyed by arthritis. Motion of the arthritic joint causes the surfaces to grate rather than glide. Progressive joint destruction makes the shoulder stiff, painful and unable to carry out its normal functions. While these degenerative changes most frequently occur in the 60s, 70s and 80s, there is an increasing incidence of people in their 40s and 50s with functionally disabling arthritis.



The X-rays of a typical arthritic shoulder show complete loss of the joint space with bone-on-bone. The view on the left shows how the ball is wearing to a flat rather than round surface. As the disease progresses, the bone continues to wear and deform. As the back wall of the socket increasingly erodes, the humeral head may shift partly



out of the socket and rest on the back socket rim (shown in the picture on the right). These are characteristic, irreversible changes that occur in shoulder arthritis.

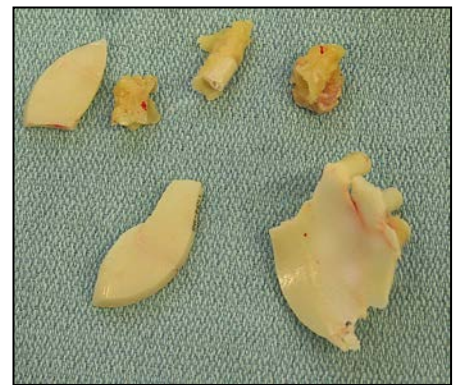
In addition to cartilage wear and bone erosion, arthritis results in stiffening and contracture of the soft tissues around the joint. These include the joint capsule, which has several important ligaments that support and stabilize the joint in specific positions. As bony changes result in loss of joint motion, the rotator cuff tendons also contract further stiffening the joint. This stiffness can be a cause of pain apart from the bone-on-bone grinding.

When symptoms begin to interfere with activities of daily of living and negatively impact one’s quality of life, joint replacement surgery may be considered. This is the most reliable solution for shoulder arthritis that has failed to respond to a program of rest, flexibility and strengthening exercises, anti-inflammatory medications and injections.

The Problem of Shoulder Replacement in Young and Active Patients

While total shoulder replacement surgery has proven to be a successful treatment for advanced shoulder arthritis, the artificial components are not designed to withstand some of the demands that active individuals expect and wish to place on them. As more people continue to engage in sports and other demanding recreational activities into their 60’s, 70’s and 80’s, shoulder replacements are being asked to tolerate more wear and tear – often the same level of use that may have predisposed the shoulder to develop arthritis in the first place.

This is problematic for the plastic glenoid component that is used to resurface the native shoulder socket. This component is prone to wear out, loosen or even break in very active individuals. This is shown in the picture to the right. When failure occurs, additional surgery is usually required to remove the damaged socket as in the case shown. If the bone underneath the socket has also been damaged by the wear process, it may be impossible to put in another socket prosthesis. In this case, the success of revision surgery is less predictable, and outcomes may be limited by inability to achieve a successful reconstruction.



It stands to reason that younger patients are more likely to experience socket wear during their life as the plastic is exposed to a longer period of use and a more active lifestyle. Considering the risk of socket failure and the higher likelihood of needing revision surgery, a conventional total shoulder replacement, which resurfaces the arthritic socket with a plastic component, may not be the best option for younger and physically demanding patients over the long term.

While partial shoulder replacement of only the humeral head removes the risk of problems with the artificial socket, it does not address changes that occur to the surface of the native glenoid due to the arthritic process. Often, the back part of the glenoid is preferentially worn as is shown in the pictures to the right. This can result in a change in the orientation of the glenoid relative the shoulder blade, and occasionally a second concavity on the back half of the socket (also called a “double concavity.”) If these pathological changes are not addressed, then patients risk a poor outcome due to persistent abnormal anatomy on the socket side. Unless the replaced humeral head is recentered into a properly oriented and shaped, concave socket, patients will continue to have pain and progressive wear and arthritis on the socket side of the joint.



The optimal treatment for end-stage shoulder arthritis in young and physically demanding patients requires an alternative that allows the humeral head to articulate with a smooth, stable, concave surface that is properly oriented relative to the scapula without the use of a prosthetic socket.

This alternative is referred to as shoulder hemiarthroplasty with non-prosthetic glenoid arthroplasty – also known as the **Ream and Run technique**. In this procedure, the humeral head is replaced with a metal ball. The socket is not replaced but is refinished in way that gives it a smooth surface and a shape which matches that of the humeral ball. This process reshapes and reorients the worn and eroded arthritic glenoid so that it behaves in the same manner as an artificial plastic socket.

The metal ball can either be inserted with a stem as would be done for most standard type shoulder replacements. In some cases, however, if a patient's anatomy allows access to the socket without removing the humeral head, a resurfacing cap prosthesis can be used. This option has the advantage of preserving more bone on the humeral side which may be advantageous if patients require revision surgery at some point in the distant future. Resurfacing prostheses are not possible in all cases, however, especially men with very large deltoid muscles. In these cases, access to the shoulder socket for reaming the glenoid smooth is often not technically possible unless the head is removed, and a standard stemmed prosthesis used. Regardless of the type of humeral head however, the recovery and results are the same and patients are not aware of any difference in the feel or function of the replacement.

Because the arthritic cartilage is removed on both sides of the shoulder joint, the roughness and grating which cause pain and stiffness are effectively treated. By excluding the plastic socket, non-prosthetic glenoid arthroplasty raises the tolerance of the shoulder for meeting the physical demands of active patients. Because wear, loosening and breakage of the metal ball are exceedingly rare, this procedure improves the longevity of the shoulder replacement and removes the risk of glenoid component failure.

This procedure has proven highly successful in restoring comfort and a high level of shoulder function in patients with severe shoulder arthritis. Like a conventional shoulder replacement operation, it is a highly technical procedure and is best performed by a surgical team who performs this surgery often as certain technical aspects are critical to outcomes.

Possible Benefits of Surgery: With proper rehabilitation, shoulder hemiarthroplasty with non-prosthetic glenoid arthroplasty restores lost function to arthritic shoulder joints. By removing the damaged joint surfaces, this procedure allows the shoulder to move in a smooth and stable manner. In experienced hands, this procedure can also address the restricting scar tissue that frequently accompanies arthritis and contributes to pain and stiffness.

The effectiveness of the procedure depends on the health and motivation of the patient, the condition of the shoulder, and the expertise of the surgeon. Strict adherence to the rehabilitation program maximizes the chances of a good result from non-prosthetic glenoid arthroplasty. Maintaining general health, fitness and nutrition as well as abstinence from cigarette smoking all improve the chances of success.

Considering Surgery

Who should consider this surgery?

Ream and Run is considered when:

1. the arthritis has a significant negative impact on a patient's quality of life,
2. the patient is sufficiently healthy to undergo the procedure,
3. the patient understands and accepts the risks and alternatives,
4. there is sufficient bone and tendon to permit the surgery, and
5. the surgeon is experienced in shoulder replacement surgery.

What happens without surgery?

The natural history of arthritis is that it usually continues to progress over time. The rate of progression varies between individuals and is unpredictable. Sometimes the pain and stiffness from shoulder arthritis will stabilize at a level that is acceptable and manageable to the patient. In general, this surgery is elective, and can be performed whenever the patient decides that the arthritis has become disabling enough to warrant treatment. However, patients who wish to delay surgery must be followed carefully to ensure that progress erosion of the socket bone does not preclude achieving the goals of shaping the reorienting the socket for a Ream and Run.

Effectiveness

Non-prosthetic glenoid arthroplasty addresses the risk of socket failure in younger and physically demanding patients. Because no plastic is inserted into the joint, there are no longer any problems related to socket wear, loosening and breaking. In the hands of an experienced surgeon, this procedure has proven very effective in terms of alleviating the pain from arthritis and restoring shoulder function. It has also proven very durable in terms of allowing patients to return to their expected level of activity. Some patients who have undergone this procedure have returned to weightlifting, water-skiing, golf and landscaping. If the shoulder is cared for properly and subsequent injuries are avoided, the benefit can last for decades.

Shoulder replacement surgery is most effective when the patients are well-motivated and follow a simple exercise program after surgery. Thus, the patient's motivation and dedication are important elements of the partnership. Ream and Run surgery can take up to two years to achieve maximal benefit in terms of regaining strength and motion.

Urgency

Shoulder hemiarthroplasty with non-prosthetic glenoid arthroplasty is an elective procedure that can be scheduled when circumstances are optimal for the patient. It is not an urgent procedure. The patient has plenty of time to become informed and to select an experienced surgeon.

Factors which the patient should consider in choosing the optimal time include the following:

- 1) The arthritis has become sufficiently disabling to impair the performance of daily activities. Patients who are still able to sleep comfortably and manage daily activities may consider waiting.
- 2) A planned period of time can be specifically dedicated to the recovery and rehabilitation process that will not interfere with other scheduled events;

- 3) Overall health and nutritional status are optimal and will not limit the ability to comply with the performance of rehabilitation;
- 4) Motivation and readiness to undertake the process of surgery, recovery and rehabilitation is a priority.

Risks

The risks of shoulder hemiarthroplasty with non-prosthetic glenoid arthroplasty include but are not limited to the following: infection, injury to nerves and blood vessels, fracture, stiffness or instability of the joint, failure of the rotator cuff, pain, and the need for additional surgeries. There are also risks to anesthesia and blood transfusion (although transfusions are not always necessary). An experienced shoulder joint replacement team will use special techniques to minimize these risks, but cannot totally eliminate them.

Managing risk

Many of the risks of this surgery can be effectively managed if they are promptly identified and treated. Infections may require a "wash out" in the operating room--occasionally removal of the artificial components is necessary. Blood vessel or nerve injury may require repair. Fracture may require surgical fixation. Stiffness or instability may require exercises or additional surgery. If the patient has questions or concerns about the course after surgery, the surgeon should be informed as soon as possible.

Preparing for surgery

Preparation

Patients should optimize their health so that they will be in the best possible condition for this procedure. Smoking should be stopped a month before surgery and not resumed for at least three months afterwards. Any heart, lung, kidney, bladder, tooth, or gum problems should be managed before surgery. Any infection may be a reason to delay the operation. The shoulder surgeon needs to be aware of all health issues, including allergies and the non-prescription and prescription medications being taken. Some of these may need to be modified or stopped. For instance, aspirin and anti-inflammatory medication may affect the way the blood clots.

The patient needs to plan on being less functional than usual for six to twelve weeks after the procedure. Driving, shopping and performing usual work or chores may be difficult during this time. Plans for necessary assistance need to be made before surgery. For individuals who live alone or those without readily available help, arrangements for home help should be made well in advance.

About the surgery

Anesthesia

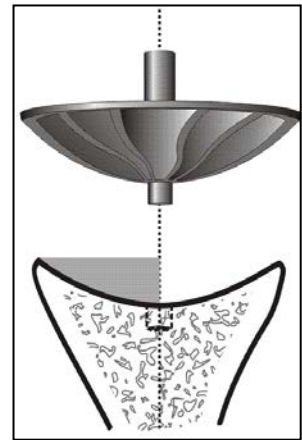
Shoulder replacement is performed using a combination of an interscalene nerve block, a long acting local anesthetic and general anesthesia. The nerve block is placed in the preoperative holding area and makes the entire affected arm numb. This has several advantages. First, it reduces the amount of general anesthesia that patients require during the surgery, thus reducing the potential for adverse anesthesia side effects. Second, it provides postoperative pain relief for up to 12 hours following the surgery, reducing the amount of narcotic pain medications that patients require, especially early after surgery when patients are recovering from anesthesia. Third, by blocking pain pathways from the

extremity to the brain before the surgery begins, nerve blocks may reduce the severity of postoperative pain, even after the block wears off. The long acting local anesthetic provides ongoing pain relief for up to 3 days after the block wears off.

Technical details

After the anesthetic has been administered and the shoulder is prepared, an incision is made across the front of the shoulder that stretches for 3 to 5 inches depending on the size of the patient. This incision allows access to the joint without damaging the important deltoid or pectoralis muscles that are responsible for a significant portion of the shoulder's power.

The muscles and other tissues near the shoulder are mobilized by removing any scar tissue that may restrict their motion. The subscapularis tendon is reflected off the humeral head taking a piece of bone with its tendon insertion. This is called a subscapularis osteotomy and it allows for a much stronger repair at the end of the case permitting earlier use of the arm. The humeral head is then resected at the appropriate height and angle as determined by the patient's individual anatomy and bone spurs from around the head are removed. The canal of the humerus is then prepared to accept the stem of the prosthesis and a trial implant is inserted that matches the dimensions of the patient's bone.



The glenoid is then exposed by releasing contracted ligaments and scar tissue that occur because of the arthritis. One proper exposure has been achieved, the surgeon must assess the degree of glenoid wear and how best to restore the glenoid orientation relative the remainder of the scapula. The reamer is then directed in such a way to restore this orientation and the glenoid is reamed until a smooth, stable, concave shape has been achieved.

The humeral implant is chosen by trialing different sizes and selecting the one that best matches the patient's anatomy and best restores the muscle balance in the joint without making the joint too tight or too loose. The arthritic glenoid is then refinished using a special spherical reamer. This reaming process corrects the shape and orientation of the socket, both of which are affected by shoulder arthritis. The curvature of the reamer nearly matches that of the humeral ball and this matching surface allows smooth and stable rotation of the ball in the socket.

Once the reaming process is completed, the final humeral component is inserted. The subscapularis tendon is then carefully repaired and closure of the muscle and skin layers completes the procedure. A drain is placed which is removed on the second morning after surgery. This prevents blood from collecting in the wound.

Length of surgery

The procedure usually takes approximately two hours; however the preoperative preparation and the postoperative recovery may add several hours to this time. Patients often spend two hours in the recovery room and two to four days in the hospital after surgery.

Recovering from surgery

Pain and pain management

The pain from this surgery is managed by a multimodal pain protocol that uses different medications synergistically to block pain from different pathways in the body. This involves the use of scheduled Tylenol, anti-inflammatory medication, Tramadol and a narcotic pain medication like Oxycodone. When these are taken together, less narcotic is needed to achieve comfort. This can limit the side effects of narcotics including nausea and constipation.

Recovery of comfort and function after shoulder hemiarthroplasty with non-prosthetic glenoid arthroplasty continues for many months after the surgery. A plastic socket is not inserted when a non-prosthetic glenoid arthroplasty is performed, there may be some added discomfort from the metal ball articulating with the bone. When the glenoid is reamed, small fractures in the surface bone are intentionally created. These tiny surface fractures initiate a healing response which improves the smoothness of the socket and may help distribute force from the arm to the body. This healing process may result in more discomfort compared to a conventional total shoulder for the first few months. However, this is only temporary and, as the healing process completes, comfort level rises to match that of total shoulder arthroplasty.

Rehabilitation

Physical therapy

Early motion after shoulder hemiarthroplasty with non-prosthetic glenoid arthroplasty is critical for achieving optimal shoulder function. We prefer patients to begin stretching exercises soon after surgery on a home program and with the assistance of a visiting therapist. We like to arrange outpatient therapy prior to surgery so that patients can start this in the first 5-7 days. We prefer therapists who have substantial experience with shoulder replacement as this can be critical to achieving the range of motion goals.

Arthritic shoulders are stiff. Although a major goal of the surgery is to relieve this stiffness by release of scar tissue, it may recur during the recovery process if range of motion exercises are not instituted immediately. For the first 6 weeks of the recovery phase, the focus of rehabilitation is on maintaining the motion that was recovered at surgery. Strengthening exercises are avoided during the first 6 weeks so as not to stress the tendon repair before it heals back to the bone. Later, once the shoulder is comfortable and flexible, strengthening exercises and additional activities are started.

Duration of rehabilitation

Because shoulders become very stiff and weak prior to surgery, it can take months to restore motion and strength. Even after formal PT has ended, we highly recommend that patients continue a home exercise program of continued cuff strengthening for up to a year following the procedure.

Returning to ordinary daily activities

Because there is a tendon that needs to be repaired at the conclusion of surgery, activity restriction for the first 12 weeks is essential to allow this tendon to fully heal. Once healed patients can progress to unrestricted activity as tolerated by comfort and function.

Long-term patient limitations

One of the primary goals of shoulder hemiarthroplasty with non-prosthetic glenoid arthroplasty is to allow physically demanding individuals to return to activities that would otherwise have been prohibited with the implantation of a plastic socket. While there are no strict limitations on participation, those activities which involve impact (chopping wood, contact sports) and those which involve heavy loads (weightlifting) may predispose the rotator cuff tendons to injury and tear. Thus patients should take caution in these types of activities to minimize the risk of damage to the operated shoulder.

Conclusion

In summary

Shoulder hemiarthroplasty with non-prosthetic glenoid arthroplasty helps restore comfort and function to shoulders damaged by degenerative joint disease and osteoarthritis. This procedure is the preferred approach to treating arthritis in young and physically demanding patients whose arthritis has advanced to the point of surgical treatment. By reshaping, reorienting and smoothing the bony socket, this procedure removes the risks associated with wear, loosening and fracture of the plastic socket.

In the hands of an experienced surgeon, shoulder hemiarthroplasty with non-prosthetic glenoid arthroplasty can be a most effective method for treating shoulders with damaged joint surfaces in a healthy and motivated patient. Pre-planning and persistent rehabilitation efforts will help assure the best possible result for the patient.