

# Total shoulder joint replacement for shoulder arthritis: Surgery with a dependable, time-tested conservative prosthesis and accelerated rehabilitation can lessen pain and improve function in shoulders with arthritis.

**Edited By:** [Frederick A. Matsen III, M.D.](#)

Last updated Tuesday, May 30, 2006

## Summary

### Overview

Total shoulder replacement surgery (arthroplasty) helps restore comfort and function to shoulders damaged by degenerative joint disease, osteoarthritis, or rheumatoid arthritis.

In shoulder arthritis the joint surface is destroyed by wear and tear, inflammation, injury, or previous surgery. Figure 1 shows the surface of a ball of the shoulder joint (humeral head) which has been destroyed by arthritis. This joint destruction makes the shoulder stiff, painful and unable to carry out its normal functions.

After performing a clinical exam, a shoulder surgeon experienced in joint replacement can find out if arthritis is the cause of the problem and if surgery would be helpful. Patients are most likely to benefit from this surgery if they are well motivated and in good health.

The goal of shoulder replacement arthroplasty is to restore the best possible function to the joint by removing scar tissue, balancing muscles, and replacing the destroyed joint surfaces with artificial ones.

Figure 2 shows the artificial components including the humeral ball (which is made of metal) and the glenoid component (which is made of plastic). The humeral ball is fixed to the humerus (arm bone) with the humeral stem. The glenoid component is fixed to the shoulder blade using a small amount of bone cement.

Total shoulder joint replacement arthroplasty is a highly technical procedure and is best performed by a surgical team who performs this surgery often. Such a team can maximize the benefit and minimize the risks. The two-hour procedure is performed under general (or nerve block) anesthesia.

Shoulder motion is started immediately after the procedure. Patients learn to do their own physical therapy and are usually discharged three days after surgery if they are comfortable and have a good range of passive motion. The recovery of strength and function may continue for up to a year after surgery.

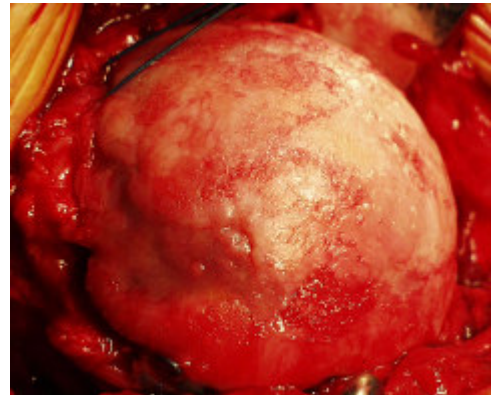


Figure 1 - This is a humeral head in situ that has been damaged by arthritis.

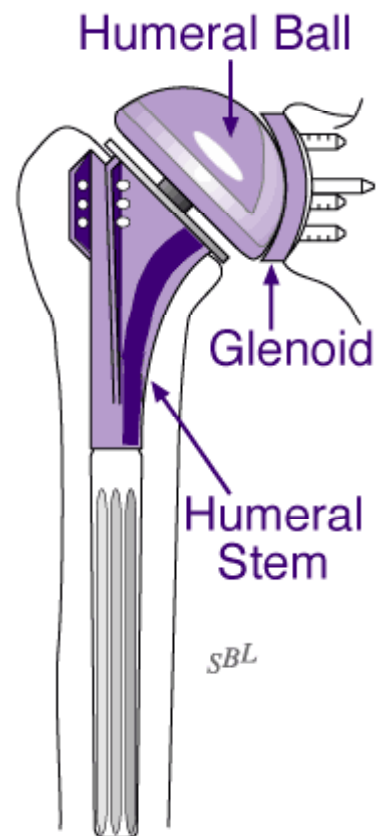


Figure 2 - Humeral implant

- [Lowell North sails away with new shoulder](#) ([uwnews.org](#))

## Streaming video



Dr. Matsen and Sarah Jackins, physical therapist with the UW Bone and Joint Surgery Center, discuss shoulder surgery with an emphasis on patient involvement in the UWTV video, "[Total Shoulder Replacement: Partnership with the Patient](#)".

## Characteristics of shoulder arthritis

Arthritis of the shoulder is a condition in which the cartilage normally covering the joint surfaces is lost.

Individuals with shoulder arthritis usually notice pain, stiffness and loss of the ability to use the shoulder for their usual activities. Commonly, they have difficulty sleeping on the affected shoulder and limited range of motion. Some people with arthritis notice a grinding feeling when the shoulder is moved. Shoulder arthritis usually gets worse over time, but the rate of this progression varies widely.

## Types

Shoulder arthritis may be of several types, including [osteoarthritis](#), degenerative joint disease, [rheumatoid arthritis](#), arthritis after injury (traumatic arthritis), arthritis after previous surgery (for example, [capsulorrhaphy arthropathy](#)), and arthritis associated with rotator cuff disease (known as [cuff tear arthropathy](#)). Arthritis may also follow infection; this is known as [septic arthritis](#). If the ball of the shoulder joint (humeral head) dies from lack of circulation, a condition known as [avascular necrosis](#) of the shoulder may result.

## Similar conditions

Shoulder arthritis must be distinguished from rotator cuff disease, frozen shoulder, and neck arthritis, each of which may produce similar symptoms. Rotator cuff tears usually cause pain and weakness, but stiffness is less common. Frozen shoulder is characterized by shoulder stiffness, but the X-rays are usually normal. Neck arthritis may cause shoulder pain and weakness that is worse when the head is held in certain positions.

## Incidence and risk factors

While not as common as rotator cuff disease, shoulder arthritis is among the most prevalent causes of shoulder pain and loss of function. Arthritis of the shoulder joint is less common than arthritis of the hip or knee. Individuals with arthritis in one joint are more likely to get it in another joint.

## Diagnosis

A physician diagnoses shoulder arthritis by reviewing the patient's history, performing a thorough physical examination of the joint and taking the proper X-rays. The examination of an arthritic shoulder reveals

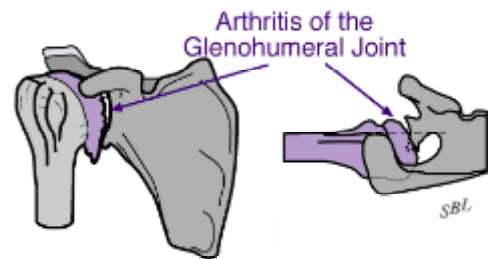
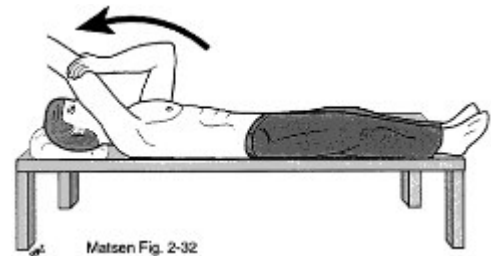


Figure 3 - Glenoid bone spurs: The figure on the left shows bone spurs at the bottom of the joint. The figure on the right shows that the ball is not centered and has worn down the back part of the socket.



Matsen Fig. 2-32

Figure 4



Matsen Fig. 2-34

Figure 5

stiffness and roughness of the joint.

X-rays of the shoulder reveal the contour of the joint surfaces and the status of the cartilage space between them. X-rays of an arthritic shoulder usually show a narrowing of the space between the ball and socket--often to the point that bone is touching bone. The left side of figure 3 shows bone spurs at the bottom of the joint. The right side of figure 3 shows that the ball is not centered and has worn down the back part of the socket. These findings indicate that the normal cartilage has been destroyed. X-rays do not show the soft tissues, such as scar tissue, that may also be limiting joint motion.

It is essential that the shoulder surgeon establish the diagnosis of arthritis before shoulder joint replacement is considered.

### Medications

Medications may be helpful in managing arthritis. In the case of rheumatoid arthritis, specific drugs may treat the inflammation that destroys the cartilage. Some of these medications are administered by injection and others by mouth. Some individuals take anti-arthritic medications for their entire lives. These medications can be quite helpful, but there may be side effects. These medications should be taken under the close supervision of a rheumatologist or other physician experienced in their use. In other types of arthritis, anti-inflammatory drugs may lessen the pain, but do not change the course of the condition. It is important that the patient be aware of the possible side effects of these medications, including stomach irritation, kidney problems and bleeding. Injections of steroids (cortisone) or lubricants (such as hyaluronic acid) into the shoulder have not been demonstrated to have lasting benefit and carry some risk of infection.

For each medication, patients should learn:

1. the risks,
2. possible interactions with other drugs,
3. the recommended dosage, and
4. the cost.

### Exercises

If exercises are not too painful, they may be helpful in maintaining the flexibility and strength of joints with arthritis. In most cases these exercises can be done in the patient's home with minimal equipment. Shoulder exercises are best performed gently several times a day on an ongoing basis. Often the exercises will help during the earlier phases of the condition. The exercises are not dangerous if they are performed gently. The diagrams show two examples of these exercises.

Figure 4 shows a patient using the left arm to help lift the stiff right shoulder in a forward direction. Figure 5 shows a patient using the left arm to gently stretch the stiff right arm in external rotation using a yardstick.

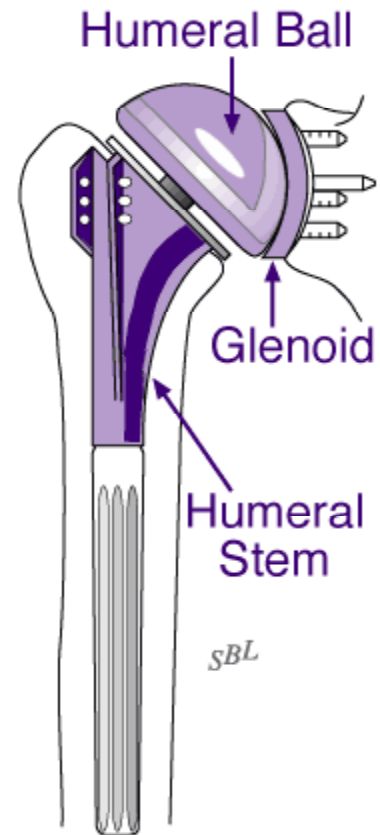


Figure 6 - Humeral Implant

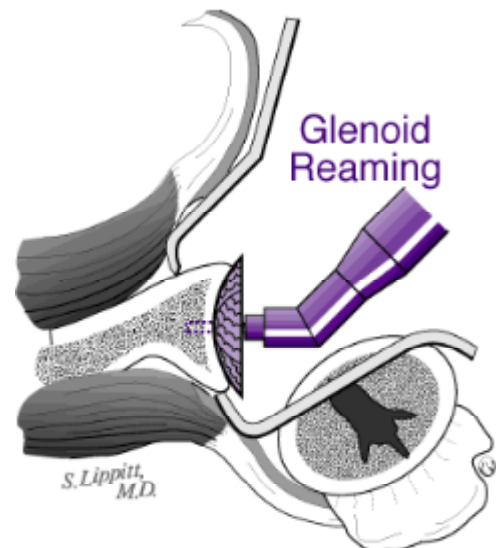


Figure 7 - Glenoid bone being reshaped with a spherical reamer.

Sometimes other types of therapy are used by physical therapists. Patients should learn the possible risks of these approaches as well as their costs and anticipated effectiveness.

### Possible benefits of shoulder replacement surgery

When combined with a good rehabilitation effort, shoulder joint replacement arthroplasty allows arthritic shoulders to regain some of their lost comfort and function. In experienced hands, this procedure can address the restricting scar tissue that frequently accompanies arthritis. It can also restore smooth, stabilizing joint surfaces when these surfaces have been damaged by arthritis.

Joint replacement surgery can improve the mechanics of the shoulder, but cannot make the joint as good as it was before the onset of arthritis. In many cases, the tendons and muscles around the shoulder have been weakened from prolonged disuse before the shoulder replacement. The scar around them needs to be removed. After the surgery, it may take months of gentle exercises before the shoulder achieves maximum improvement.

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. When performed by an experienced surgeon, the published literature shows that shoulder replacement arthroplasty usually provides improved shoulder comfort and function. The greatest improvements are in the ability of the patient to sleep, to perform activities of daily living, and to perform non-contact recreational activities.

### Types of surgery recommended

Joint replacement surgery is the most effective method for restoring comfort and function to shoulders damaged by severe arthritis.

When the normally smooth surfaces of the shoulder joint are severely damaged by arthritis, injury or surgery, shoulder joint replacement arthroplasty may be the most effective method for restoring comfort and function to the joint. Other surgical options, such as arthroscopy or "clean up" operations have not been shown to give lasting benefit. Shoulder fusion can stabilize the joint, but does not allow motion at the shoulder joint. Removing the joint allows some motion at the joint, but does not provide stability.

### Who should consider shoulder replacement surgery?

Joint replacement surgery is considered when:

1. the arthritis is a major problem for the patient,
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.

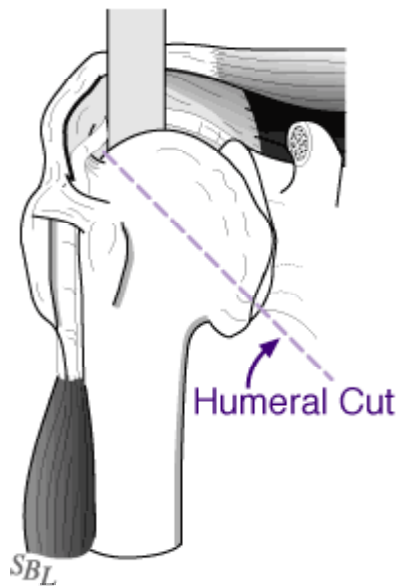


Figure 8 - Humeral Cut: the amount of the damaged ball that is removed

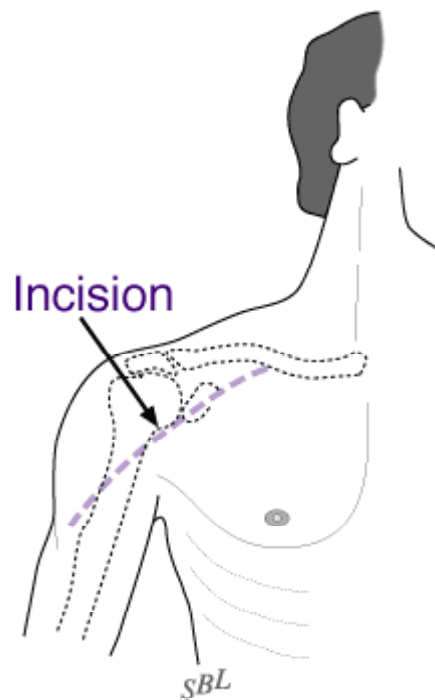


Figure 9 - Axillary incision

Total shoulder replacement is most effective when the patient follows a simple exercise program after surgery. Thus, the patient's motivation and dedication are important elements of the partnership.

### What happens without surgery?

In general, this surgery is elective, and can be performed whenever conditions are optimal. Sometimes the pain and stiffness from shoulder arthritis will stabilize at a level that is acceptable to the patient. In such cases the patient can delay surgery without compromising the potential for future surgery. However, in cases of rheumatoid arthritis, excessive delay may result in loss of the tendon and bone, making the surgery more difficult for the patient and for the surgeon.

### Surgical options

Several types of shoulder arthroplasty are used to manage arthritis. In total shoulder arthroplasty, the surfaces of both the humeral head (ball) and the glenoid (socket) are resurfaced with metal and plastic implants. Figure 6 shows the metal humeral ball and humeral stem as well as the plastic glenoid prosthesis. In shoulder hemiarthroplasty, only the humeral head surface is replaced. In shoulder hemiarthroplasty with non-prosthetic glenoid arthroplasty, the humeral surface is replaced and the glenoid socket is reshaped, but Figure 7 shows the glenoid bone being reshaped with a spherical reamer. Figure 8 shows the amount of the damaged ball that is removed (humeral cut).

### Effectiveness

In the hands of an experienced surgeon, shoulder arthroplasty can be very effective in restoring comfort and function to the shoulder of a well-motivated patient. The greatest benefits are often the ability to sleep on the affected shoulder and the ability to perform usual activities of daily living. As long as the shoulder is cared for properly and subsequent injuries are avoided, the benefit can last for decades.

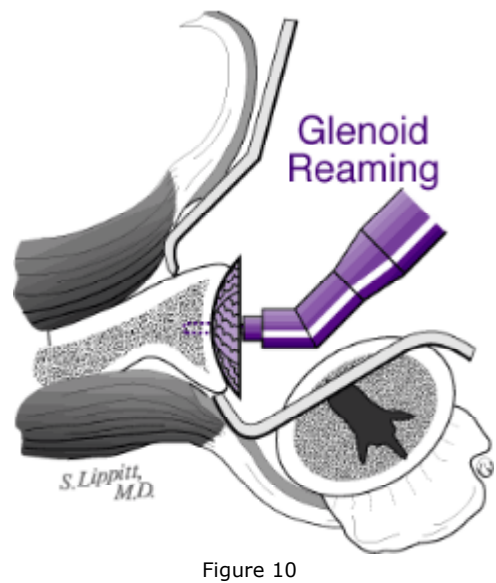
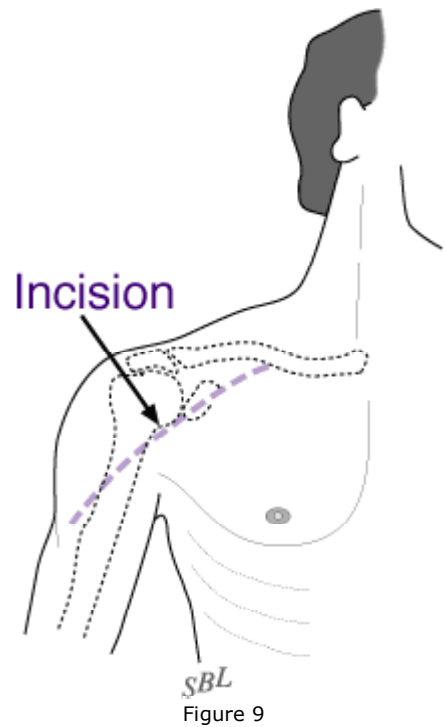
### Urgency

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

### Risks

The risks of total shoulder surgery include but are not limited to the following: infection, injury to nerves and blood vessels, fracture, stiffness or instability of the joint, loosening or wear of the artificial parts, 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 shoulder arthroplasty 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. Loosening or wear of the components may require surgical revision. If the patient has questions or concerns about the course after surgery, the surgeon should be informed as soon as possible.

**Preparation**

Total shoulder joint replacement surgery is considered for healthy and motivated individuals in whom arthritis interferes with shoulder function.

Successful shoulder replacement depends on a partnership between the patient and the experienced shoulder surgeon. 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. Since blood transfusion may be necessary, patients may choose to have a blood bank draw and store their own blood for a possible autotransfusion.

Figure 9 shows the incision used for a total shoulder replacement. This area of skin must be clean and free from sores and scratches.

Before surgery, patients should consider the limitations, alternatives and risks of surgery. Patients should also recognize that the result of surgery depends in large part on their efforts in rehabilitation after surgery.

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.

**Timing**

Shoulder replacement arthroplasty can be delayed until the time that is best for the patient's overall well-being. However, in cases of rheumatoid or other types of inflammatory arthritis, excessive delays can result in the loss of bone and tendon tissue. These losses can compromise the quality of the surgery and its result.

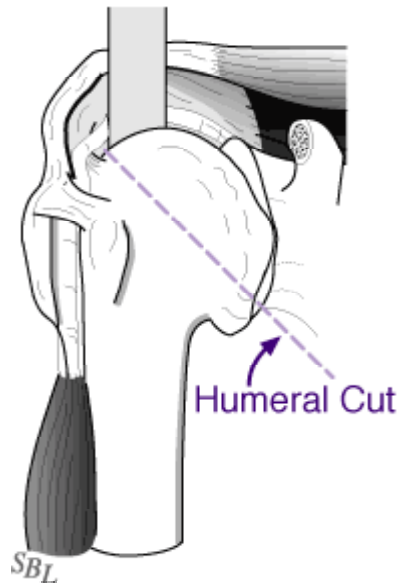


Figure 11

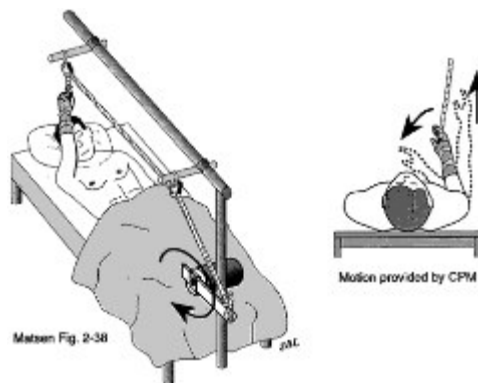


Figure 12 - Continuous passive motion machine

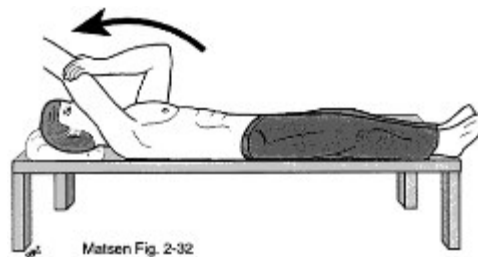


Figure 13

## Costs

The surgeon's office should provide a reasonable estimate of:

- the surgeon's fee,
- the hospital fee, and
- the degree to which these should be covered by the patient's insurance.

## Surgical team

Shoulder replacement arthroplasty is a technically demanding procedure that should be performed by an experienced surgeon in a medical center accustomed to performing shoulder joint replacements at least several times a month. Patients should inquire as to the number of shoulder arthroplasty procedures that the surgeon performs each year and the number of these procedures performed in the medical center each year.



Figure 14

## Finding an experienced surgeon

Because less than twenty thousand of these procedures are performed in the United States each year, it is unlikely that every community has an experienced shoulder arthroplasty surgeon who performs many of these procedures each year. Surgeons specializing in shoulder joint replacement may be located through university schools of medicine, county medical societies, or state orthopaedic societies. Other resources include local rheumatologists or professional societies such as the [American Shoulder and Elbow Surgeons Society](#).

## Facilities

Shoulder replacement arthroplasty is usually performed in a major medical center that performs these procedures on a regular basis. These centers have surgical teams and facilities specially designed for this type of surgery. They also have nurses and therapists who are accustomed to assisting patients in their recover from shoulder replacement surgery.

## Technical details

Shoulder replacement surgery is a highly technical procedure; each step plays a critical role in the outcome.

After the anesthetic has been administered and the shoulder is prepared, an incision is made across the front of the shoulder from the middle of the collarbone to the middle of the arm bone as shown in figure 9. 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. Figure 10 shows how the tendon of the subscapularis muscle is cut to gain access to the joint and released circumferentially (a 360-degree release) to restore its length and mobility. Figure 11 shows where the arthritic humeral head (ball of the joint) is removed. The bone spurs are removed to prepare the bone for the humeral prosthesis.

If the glenoid socket is unaffected or in other selected conditions, a hemiarthroplasty may be performed (replacing the ball only). For example in cuff tear arthropathy, a hemiarthroplasty (replacing the humeral joint surface only) is usually selected because the anatomy does not favor the use of a glenoid prosthesis. The humeral component is made of metal and is usually press fit, but sometimes cemented, into the shaft of the bone of the humerus.

If the glenoid is affected, but conditions do not favor the insertion of a glenoid component, a non-prosthetic glenoid arthroplasty may be performed along with a humeral hemiarthroplasty. In this procedure, the glenoid shape and orientation are corrected, but a glenoid prosthesis is not inserted. The reshaping of the socket using a spherical reamer is shown in the figure. The prosthetic ball of the humeral component articulates with the reshaped bony socket of the glenoid. This procedure may be selected when the patient is interested in performing heavy activities that might endanger the fixation of a polyethylene glenoid component.

In a total shoulder joint replacement, the glenoid bone is shaped and oriented as in the non-prosthetic glenoid arthroplasty and then covered with a polyethylene glenoid component, as seen in the figure. A small amount of bone cement is used to hold the artificial glenoid socket in place.

At the conclusion of any of these procedures, the subscapularis tendon is securely repaired to the bone. This repair requires protection from active use for at least 6 weeks while it is healing.

### **Anesthetic**

Shoulder joint replacement surgery may be performed under a general anesthetic or under a brachial plexus nerve block. A brachial plexus block can provide anesthesia for several hours after the surgery. The patient may wish to discuss their preferences with the anesthesiologist before surgery.

### **Length of shoulder replacement 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.

### **Pain and pain management**

Recovery of comfort and function after shoulder arthroplasty continues for the first year after surgery. The rehabilitation is carried out largely by the patient under the supervision of the surgeon.

Shoulder replacement arthroplasty is a major surgical procedure that involves cutting of skin, tendons and bone. The pain from this surgery is managed by the anesthetic and by pain medications. Immediately after surgery, strong medications (such as morphine or Demerol) are often given by injection. Within a day or so, oral pain medications (such as hydrocodone or Tylenol with codeine) are usually sufficient.

### **Use of medications**

Initially pain medication is usually administered intravenously or intramuscularly. Sometimes patient controlled analgesia (PCA) is used to allow the patient to administer the medication as it is needed. Hydrocodone or Tylenol with codeine are taken by mouth. Intravenous pain medications are usually needed only for the first day or two after the procedure. Oral pain medications are usually needed only for the first two weeks after the procedure.

### **Effectiveness of medications**

Pain medications can be very powerful and effective. Their proper use lies in the balancing of their pain relieving effect and their other, less desirable effects. Good pain control is an important part of the postoperative management.

### **Important side effects**

Pain medications can cause drowsiness, slowness of breathing, difficulties in emptying the bladder and bowel, nausea, vomiting and allergic reactions. Patients who have taken substantial narcotic medications in the recent past may find that usual doses of pain medication are less effective. For some patients,



balancing the benefit and the side effects of pain medication is challenging. Patients should notify their surgeon if they have had previous difficulties with pain medication or pain control.

### **Hospital stay**

After surgery the patient spends an hour or so in the recovery room. A drainage tube is usually used to remove excess fluid from the surgical area. The drain is usually removed on the second day after surgery. Bandages cover the incision. They are usually changed the second day after surgery.

Patients are discharged as soon as the incision is dry, the shoulder is comfortable with oral pain medications, the patient can perform the range of motion exercises, and the home support systems for the patient are in place. Discharge is usually on the third or fourth day after surgery.

### **Recovery and rehabilitation in the hospital**

Early motion after total shoulder replacement helps achieve the best possible shoulder function. Arthritic shoulders are stiff. One of the major goals of total shoulder replacement surgery is to relieve much of this stiffness. However, after surgery scar tissue will tend to recur and limit movement unless motion is started immediately. This early motion is facilitated by the complete surgical release of the tight tissues so that after surgery the patient has only to maintain the range of motion achieved at the operation.

A continuous passive motion (CPM) machine is often used to gently move the shoulder in the recovery room immediately after surgery. The CPM machine, shown in figure 12, is used for the first few days after surgery whenever the patient is in bed.

During the hospitalization, the patient learns a simple rehabilitation program that will be used for maintaining the range of motion at home after discharge. Figures 13 and 14 show two of the exercises used to maintain elevation and rotation of the arm. On the day of surgery or on the day after, the physical therapist teaches the patient gentle range of motion exercises. The patient is usually shown how to stretch the shoulder forward and out to the side, preventing stiffness and adhesions.

Walking and use of the arm for gentle activities are encouraged soon after surgery.

### **Hospital discharge**

At the time of discharge, the patient should be relatively comfortable on oral medications, should have a dry incision, should understand their exercises and should feel comfortable with the plans for managing the shoulder. For the first month or so after this procedure, the operated arm may be less useful than it was immediately beforehand.

The specific limitations can be specified only by the surgeon who performed the procedure. It is important that the repaired tendons not be challenged until they have had a chance to heal. Usually the patient is asked to lift nothing heavier than a cup of coffee for six weeks after the surgery.

Management of these limitations requires advance planning to accomplish the activities of daily living during the period of recovery.

### **Convalescent assistance**

Patients usually require some assistance with self-care, activities of daily living, shopping and driving for approximately six weeks after surgery. Patients usually go home after this surgery, especially if there are people at home who can provide the necessary assistance, or if such assistance can be arranged through an agency. In the absence of home support, a convalescent facility may provide a safe environment for recovery.

Recovery of comfort and function after shoulder arthroplasty continues for many months after the surgery.

Improvement in some activities may be evident as early as six weeks. With persistent effort, patients make progress for as long as a year after surgery.

### **Physical therapy**

Early motion after total shoulder replacement is critical for achieving optimal shoulder function.

Arthritic shoulders are stiff. One of the major goals of total shoulder replacement surgery is to relieve much of this stiffness. However, after surgery scar tissue will tend to recur and limit movement unless motion is started immediately. This early motion is facilitated by the complete surgical release of the tight tissues so that after surgery the patient has only to maintain the range of motion achieved at the operation. Later on, once the shoulder is comfortable and flexible, strengthening exercises and additional activities are started.

### **Rehabilitation options**

It is often most effective for the patient to carry out their own exercises so that they are done frequently, effectively and comfortably. Usually, a physical therapist or the surgeon instructs the patient in the exercise program and advances it at a rate that is comfortable for the patient. For the first six weeks after surgery, emphasis is placed on optimizing the flexibility and range of motion of the shoulder through gentle stretching exercises. After six weeks, these stretching exercises are continued and strengthening exercises are added.

### **Can rehabilitation be done at home?**

In general the exercises are best performed by the patient at home. Occasional visits to the surgeon or therapist may be useful to check the progress and to review the program.

### **Usual response**

Patients are almost always satisfied with the increases in range of motion, comfort and function that they achieve with the exercise program. If the exercises are uncomfortable, difficult, or painful, the patient should contact the therapist or surgeon promptly.

### **Risks**

This is a safe rehabilitation program with little risk.

### **Duration of rehabilitation**

Once the range of motion and strength goals are achieved, the exercise program can be cut back to a minimal level. However, gentle stretching is recommended on an ongoing basis.

### **Returning to ordinary daily activities**

In general, patients are able to perform gentle activities of daily living using the operated arm from two to six weeks after surgery. Walking is strongly encouraged. Driving should wait until the patient can perform the necessary functions comfortably and confidently. Recovery of driving ability may take six weeks if the surgery has been performed on the right shoulder, because of the increased demands on the right shoulder for shifting gears.

With the consent of their surgeon, patients can often return to activities such as swimming, golf and tennis at six months after their surgery.

### **Long-term patient limitations**

Patients should avoid activities that involve major impact (chopping wood, contact sports, sports with major risk of falls) or heavy loads (lifting of heavy weights, heavy resistance exercises). These activities may increase the chance of rotator cuff tear, loosening, wear or fracture.

### **Costs**

The surgeon and therapist should provide the information on the usual cost of the rehabilitation program. The program is quite cost-effective, because it is based heavily on home exercises.

### **Summary of shoulder replacement surgery for shoulder arthritis**

Total shoulder replacement arthroplasty helps restore comfort and function to shoulders damaged by degenerative joint disease, osteoarthritis, or rheumatoid arthritis.

In the hands of an experienced surgeon, shoulder joint replacement arthroplasty can be a most effective method for restoring comfort and function to 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.

### **Surgery for shoulder arthritis at the University of Washington**

If you are interested in making an appointment to discuss this procedure, you can request an appointment using our online referrals website. To request a referral online, [please click here](#). You can also call 206-598-7416 to make an appointment.