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Joint replacement surgery with a CAP prosthesis for shoulder arthritis: A Patient's Guide.

Frederick A. Matsen III, M.D.
Professor and Chair, Orthopaedics & Sports Medicine
University of Washington Medical Center

Summary

Overview

Arthritis of the shoulder is a devastating condition that can seriously compromise the comfort and function of the shoulder. This condition is characterized by the permanent loss of the normal smooth surface of the ball and socket of the shoulder joint. The cartilage that normally provides this smooth surface cannot be restored and the resulting loss of comfort and function of the shoulder (pain, weakness, stiffness and grinding) cannot be totally regained. When the symptoms of shoulder arthritis are severe, shoulder joint replacement arthroplasty becomes a consideration.

After performing a clinical exam, a surgeon experienced with shoulder arthritis can suggest what type of joint-replacement surgery is most likely to be helpful to the patient with the condition. Patients are most likely to benefit from surgery if they are motivated and in good health.

Joint replacement with a resurfacing CAP prosthesis preserves the maximal amount of bone. This is a highly technical procedure and is best performed by a team that has experience with this surgery. Such a team can maximize the benefit and minimize the risks of this procedure.

The two-hour surgery is performed under general (or nerve block) anesthesia.

Patients can use their arm immediately after the procedure and do not need extensive therapy.

Review of Condition

Types

Shoulder arthritis may result from an injury, but it commonly arises slowly over time. It may also be caused by conditions where blood circulation to the

ball of the ball and socket joint is disrupted, such as avascular necrosis.

Similar conditions

Shoulder arthritis must be distinguished from other conditions, such as rotator-cuff tear, frozen shoulder, and neck arthritis, each of which may produce similar symptoms. Arthritis usually causes stiffness without weakness. Rotator-cuff tears usually cause pain and weakness, but stiffness is less common. Frozen shoulder causes 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

Shoulder arthritis can affect shoulders of either gender and at any age, but is more common in those over 40 years old. Joint replacement with a resurfacing CAP prosthesis may be particularly attractive for younger patients with arthritis.

Diagnosis

Shoulder arthritis is diagnosed by a history of progressive loss of shoulder function (often without an injury), a physical examination showing stiffness and grinding on movement, and a characteristic appearance on X-ray. In these X-rays the humeral head (ball of the shoulder joint) can be seen contacting the socket without the normal space occupied by articular cartilage.

Shoulder arthritis is best diagnosed by an orthopaedic surgeon with experience in shoulder disorders. Certain surgeons specialize in shoulder-replacement surgery for arthritis. Such surgeons may be found in the shoulder services of major medical centers.

One therapy: Exercise and Medication

If the symptoms of shoulder arthritis are mild, the condition may be treated with gentle motion and exercises to strengthen the deltoid and other muscles around the shoulder. Mild analgesic medications may also relieve some of the symptoms of shoulder arthritis.

Possible benefits of shoulder-replacement surgery with a CAP resurfacing prosthesis

When exercises are not successful, most cases of shoulder arthritis are considered possible candidates for shoulder joint replacement surgery. In cases where the patient and doctor want to avoid a stem down the shaft of the humerus (upper-arm bone), a resurfacing CAP prosthesis is considered.

Joint-replacement surgery can improve the mechanics of the shoulder by providing a smooth joint surface, but it cannot make the joint as good as it was before the arthritis set in. 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, shoulder joint replacement arthroplasty can provide improved stability, comfort, and function. After surgery, the patient can sleep and perform some daily living tasks.

Considering Surgery

Types of surgery recommended

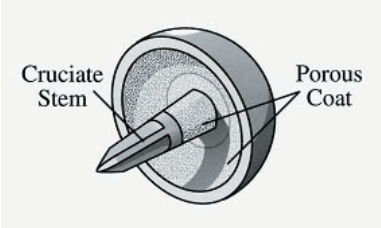


Figure 1

Several types of surgery can be helpful in the management of shoulder arthritis (arthritis of the glenohumeral joint). These surgeries include a replacement of the humeral head with a resurfacing CAP prosthesis [Figures 1 and 2], a humeral hemiarthroplasty with a non-prosthetic glenoid arthroplasty, and a total shoulder arthroplasty. If the rotator cuff is deficient, a rotator-cuff-tear (CTA) prosthesis may be considered. Finally, if the shoulder is unstable a reversed prosthesis, such as the Delta, may be needed.

Figure 2

Who should consider shoulder replacement surgery with a CAP resurfacing prosthesis?

Patients with shoulder arthritis should consider shoulder joint replacement arthroplasty with a resurfacing (CAP) prosthesis if:

- the shoulder arthritis is a major problem for the patient,
- the patient is sufficiently healthy to undergo the procedure,
- the patient understands and accepts the risks and alternatives,
- there is sufficient bone to permit the surgery,
- the surgeon is experienced in shoulder replacement surgery, and
- the features of the arthritis and the shoulder favor a resurfacing prosthesis rather than a prosthesis with a stem implanted in the shaft of the bone.

Shoulder replacement surgery with a resurfacing (CAP) prosthesis is most effective when the patient follows a simple exercise program after surgery and understands the limitations of the procedure. Thus, the patient's motivation and cooperation are important elements of the partnership.

What happens without surgery?

The rate of progression of shoulder arthritis is usually slow, thus surgery is not urgent.

Risks

Shoulder replacement surgery for shoulder arthritis using a resurfacing (CAP) prosthesis carries significant risks. These include (but are not limited to): infection (which can sometimes require revision surgery, including removal of the prosthesis), injury to nerves and blood vessels, fracture, joint stiffness or instability, dislocation, loosening of the prosthesis, pain, failure of tendon or muscle attachment, and the need for additional surgeries—any of which may result in major loss of function to the arm. There are also risks of anesthesia and blood transfusion (although transfusions are not usually necessary). An experienced shoulder-joint-replacement team can minimize these risks but cannot eliminate them.

Managing risk

Some of these risks can be managed if problems are promptly identified and treated. Infections may require a wash out in the operating room—sometimes

complete removal of the prosthesis is necessary. Blood-vessel or nerve injuries and bone fractures may require repair. Stiffness or instability may require exercises or additional surgery. Loosening of the prosthesis may require surgical tightening. If patients have questions or concerns about the course after surgery, they should tell the surgeon as soon as possible.

Preparing for Surgery

Preparation

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.

Before surgery, the patient should consider the limitations of, alternatives to, and risks of surgery. Patients should also recognize that shoulder replacement cannot restore normal function to the shoulder damaged by arthritis.

The patient needs to plan on carefully protecting the arm for three to six weeks after the procedure. Driving, shopping, and performing usual work or chores may be difficult after surgery. Plans for necessary assistance need to be made before surgery. For patients 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 health and convenience. However, excessive delays can result in the loss of bone, making the reconstruction more difficult for the surgeon and the patient.

Costs

The surgeon's office should provide a reasonable estimate of the surgeon's fee, the hospital's fee, and the degree to which these may be covered by the patient's insurance.

Surgical team

The surgery is a technically demanding procedure that should be performed by those with experience. 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.

Finding an experienced surgeon

Because relatively few shoulder arthroplasties are performed in the United States each year, it is unlikely that every community has an experienced shoulder arthroplasty surgeon. 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. These centers have surgical teams and facilities specially designed for this type of surgery—performing elbow joint replacements at least ten times a year.They also employ nurses and therapists who are accustomed to assisting patients in their recovery from shoulder replacement surgery.

About the Procedure

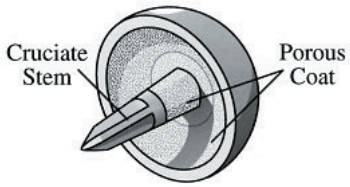
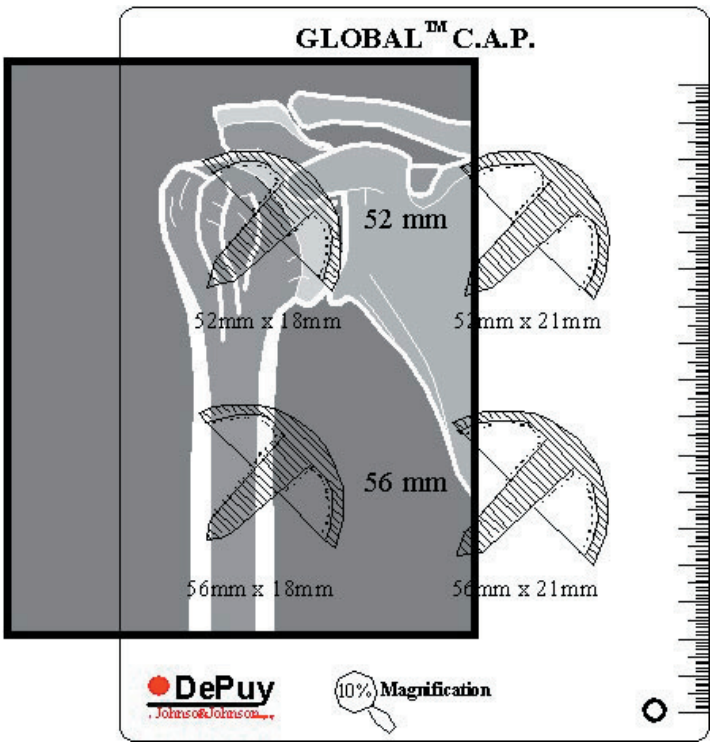


Figure 3

Technical details

Shoulder replacement surgery with resurfacing (CAP) prosthesis [Figure 3] for shoulder arthritis is a highly technical procedure; each step plays a critical role in the outcome. Before surgery x-rays are used to plan the procedure [Figure 4].



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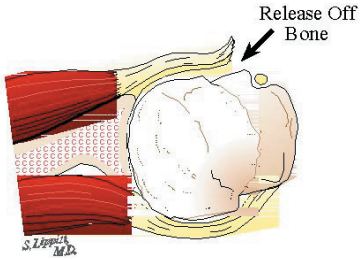


Figure 5

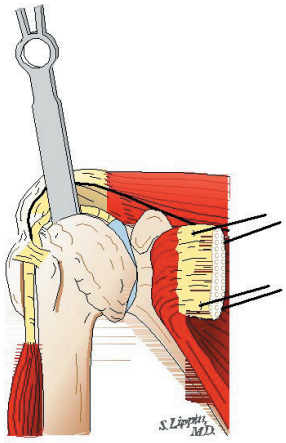
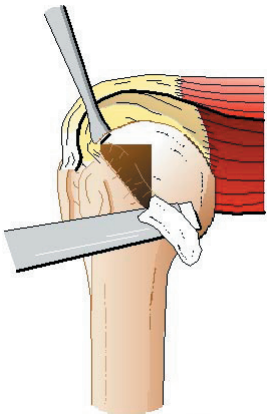


Figure 6

After the anesthetic has been administered and the shoulder is specially prepared to minimize the risk of infection, an incision is usually made across the front of the shoulder between the deltoid and the pectoralis muscle. One tendon (that of the subscapularis) is cut to allow access to the inside of the joint and to release the limitation of external rotation [Figure 5]. With the subscapularis released, the arthritic ball is exposed [Figure 6]. The bone spurs (osteophytes) are removed [Figure 7]. The diameter and height of



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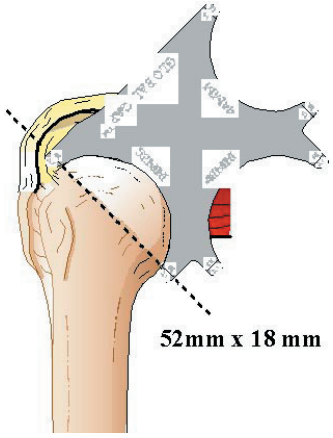

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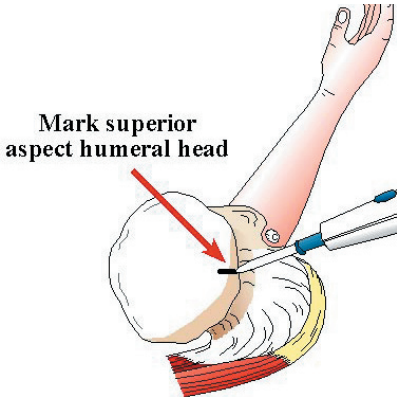

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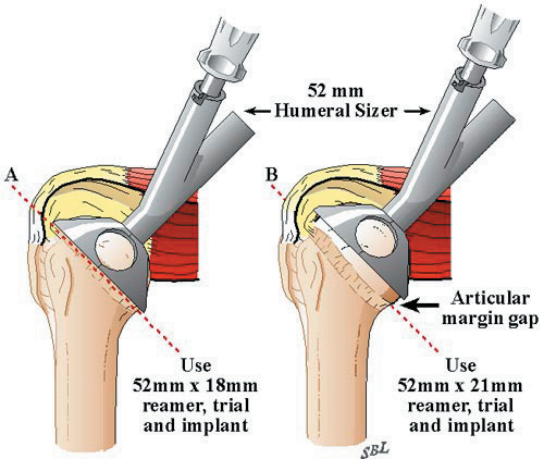

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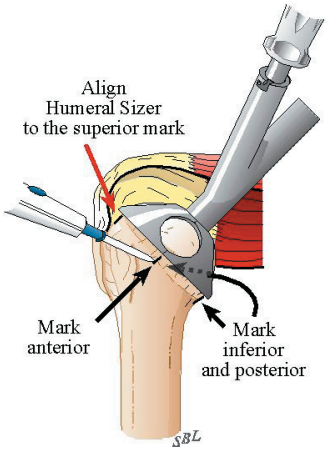

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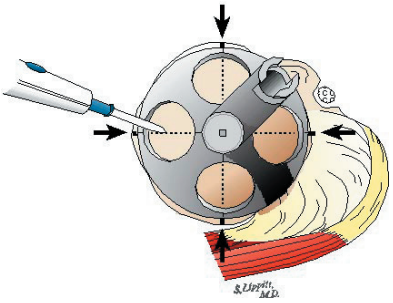

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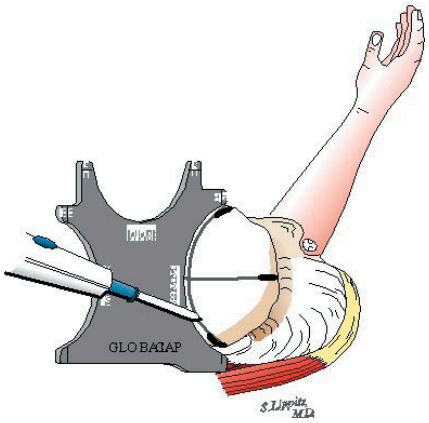

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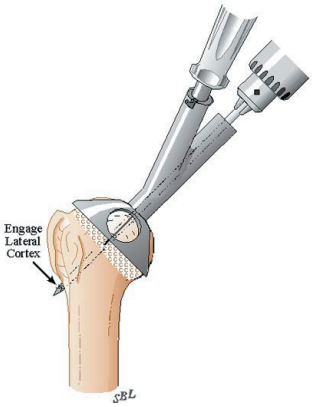

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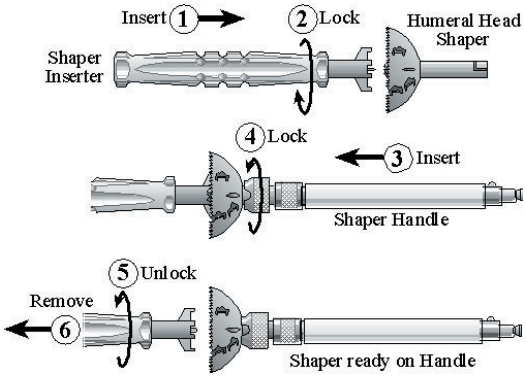
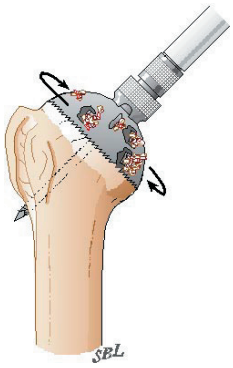


Figure 15

the ball of the shoulder (humeral head) is measured [Figure 8]. The upper aspect of the humeral head is marked for orientation [Figure 9]. A 'sizer' is then used to confirm the size of the humeral head [Figure 10] and to mark the four quadrants [Figure 11] using the sizer windows [Figure 12] and a cut-out guide [Figure 13]. These orienting marks guide the precise placement of a guide wire [Figure 14]. The shaper reamer is assembled [Figure 15] and used to ream the head to fit the prosthesis precisely [Figure 16]



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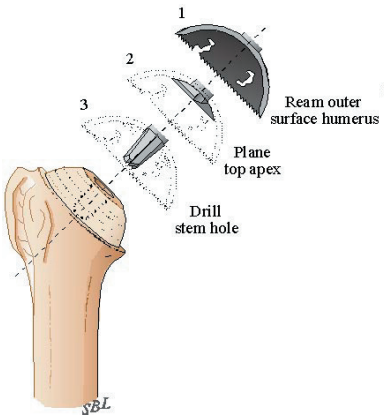

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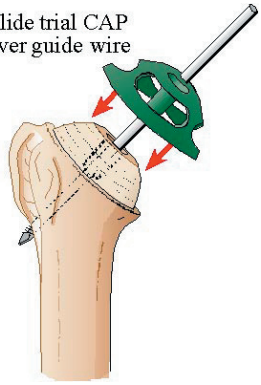

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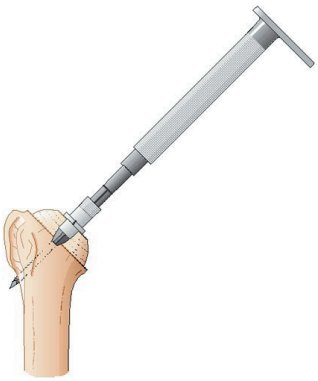

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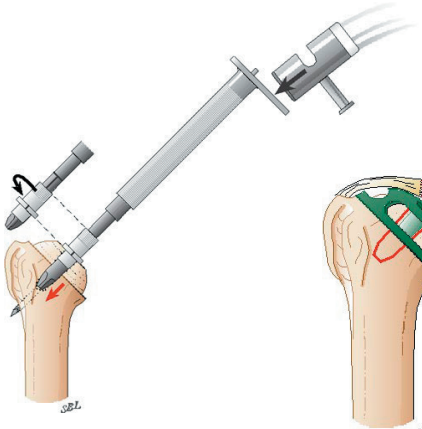

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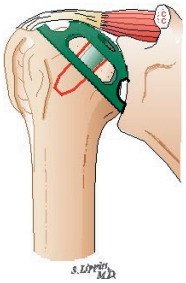

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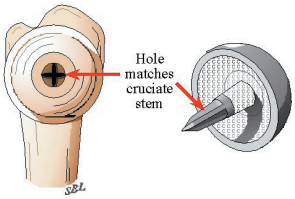

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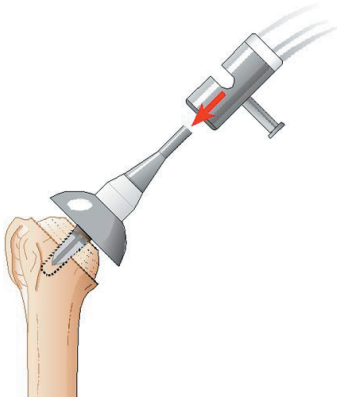

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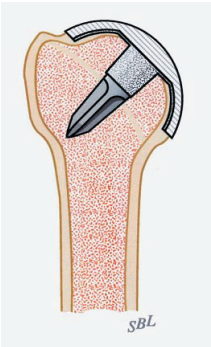

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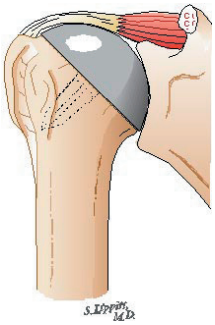

Figure 25

using its triple-reaming geometry [Figure 17]. A trial resurfacing (CAP) prosthesis is placed [Figure 18]. A punch is used to create the central fixation hole [Figures 19 and 20]. With the trial in place, the ball is put back into the joint [Figure 21]. Once the excellence of fit of the trial is ascertained, the definitive humeral head prosthesis is inserted [Figure 22] and driven into place [Figure 23]. The desired fit is shown in cross section [Figure 24]. The ball is placed back in the joint [Figure 25]. The figures show a case where the portion of the humeral head damaged by a condition known as avascular necrosis [Figure 26] is replaced with a resurfacing (CAP) prosthesis [Figures 27 and 28]. At the conclusion of the procedure, the subscapularis tendon is repaired [Figure 29].

Figure 26

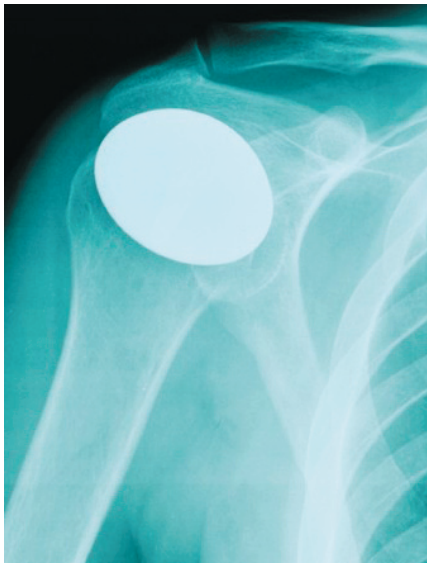

Figure 27

Figure 28

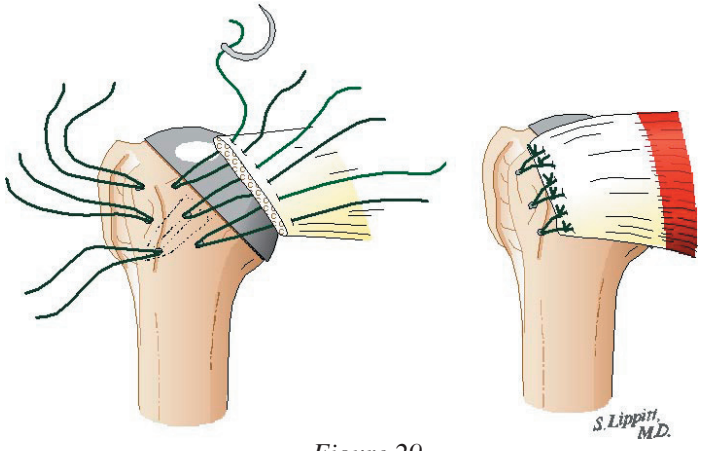

Figure 29

If the socket is damaged by the arthritis, resurfacing of the humeral head (ball of the shoulder joint) alone may be insufficient. In such cases a humeral hemiarthroplasty with a non-prosthetic glenoid arthroplasty or a total shoulder arthroplasty may be necessary.

Anesthetic

Shoulder joint replacement surgery may be performed under a general anesthetic or under a brachial plexus nerve block. The patient should discuss his or her preferences with the anesthesiologist before surgery.

Length

The procedure usually takes approximately one-and-a-half 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

Recovery of comfort and function after humeral prosthetic arthroplasty with a resurfacing (CAP) prosthesis is progressive after the surgery. Often the benefits become apparent to the patient after two to six weeks.

This is a major surgery that involves the cutting of skin, tendon, and bone and removal of scar tissue, as well as re-suturing of tendon back to bone. The pain from this surgery is managed by the anesthetic and by pain medications. Immediately after surgery, strong drugs (such as morphine or Demerol) may be given by injection and by mouth. Sometimes patient-controlled analgesia is used to allow the patient to administer the medication as it is needed. Within a day or so, oral pain medications (such as hydrocodone or Tylenol with codeine) are usually sufficient. Oral pain medications are usually needed only for the first two weeks after the procedure. On the other hand, some patients need surprisingly little pain medication after this procedure. In older patients it is often safer to use less pain medication.

Side effects

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 (such as slowed breathing, sleepiness, nausea, constipation, or difficulty urinating). Good pain control is an important part of postoperative management.

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 just the use of oral pain medications, the patient can care for the shoulder, 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, protected motion is important after a shoulder replacement with a resurfacing (CAP) prosthesis to help achieve the best possible shoulder function. The surgeon will provided detailed information on the optimal rehab program.

During the hospitalization, the patient learns a simple rehabilitation program that will be used at home after discharge. The arm is kept in a sling for several weeks after surgery to allow for early healing.

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.

Only the surgeon who performed the procedure can specify limitations to moving the arm. It is important that the reconstructed shoulder not be challenged until it has 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 daily tasks during the period of recovery.

Convalescent assistance

Patients usually require some assistance with self care, activities of daily living, shopping, and driving for at least six weeks after surgery. They usually go directly 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 procedure. Improvement in some activities may be evident as early as six weeks. With persistent effort, patients can make progress for as long as a year after surgery.

Rehabilitation at home

Most patients find the recovery of comfort and function can be accomplished without formal physical therapy.

In general rehabilitation for this surgery is best performed by the patient at home. Occasional visits to the surgeon or therapist may be useful to check the patient's progress and to review the program.

Patients are almost always satisfied with the increases in comfort and function that are achieved with the rehabilitation program. If the exercises are uncomfortable, difficult, or painful, the patient should contact the surgeon promptly.

The rehabilitation program is safe and holds little risk. The program is quite cost-effective, because it is based heavily on home exercises.

Returning to ordinary daily activities

In general, individuals are able to perform gentle activities of daily living with the operated arm at the side starting four weeks after surgery. Walking with the arm protected is strongly encouraged. Driving should wait until the patient can perform the necessary functions comfortably and confidently. This may take up to 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 may be able to return to progressive activities after their surgery. It is important to remember that shoulder arthroplasty does not make the shoulder normal. It will never totally regain full comfort, strength, range of motion, or function. Stressful activities and activities with the arm in extreme positions may never be possible after this procedure.

Long-term patient limitations

To minimize the risk of re-injury, patients should avoid activities that involve major impact (chopping wood, contact sports, activities with major risk of falls) or heavy loads (lifting of heavy weights, heavy resistance exercises) after this surgery.

Conclusion

Shoulder arthritis can be a devastating condition that seriously compromises the comfort and function of the shoulder. The shoulder cannot be fully restored to its un-injured condition. However, a motivated, healthy patient in the hands of an experienced surgeon can see the restoration of substantial comfort and function with shoulder replacement surgery followed by rehabilitation.

Surgery for Shoulder Arthritis at the University of Washington Medical Center

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, go to www.orthop.washington.edu. You can also call 206-598-7416 to make an appointment.

To see this article online and review other articles and links to videos on related subjects, visit www.orthop.washington.edu/shouldercap.

Note: Thanks to the DePuy Company, the distributor of the resurfacing (CAP) prosthesis, for their permission to use these illustrations.

ABOUT DR. FREDERICK MATSEN

Dr. Matsen has dedicated his entire professional life to developing excellence in Orthopaedics and Sports Medicine at the University of Washington. Starting with his residency here in 1971, he developed an interest in shoulder and elbow reconstruction. A fellowship with the father of modern shoulder surgery, Dr. Charles S. Neer II, confirmed his lifetime commitment to improving the art of care of patients with simple and complex problems involving the shoulder and elbow. He has partnered with Charles Rockwood, a fellow Texan, in editing the definitive text in shoulder surgery, *The Shoulder*, now in its third edition from Saunders. He has also written *Practical Evaluation and Management of the Shoulder* and most recently, along with a former shoulder fellow Steve Lippitt, has published *Shoulder Surgery, Principles and Procedures*, also published by Saunders. Matsen and his partner Kevin Smith are the primary faculty for a fellowship in shoulder and elbow surgery.

Dr. Matsen is also the medical director for University of Washington Sports Medicine, a group that has the honor of caring for the varsity student athletes at the UW. He is also director of the Residency Program (coordinated by fellow professor Doug Hanel), which is recognized as one of the top orthopaedic residencies in the United States.

Finally, he is chair of the Department of Orthopaedics and Sports Medicine, a position he has held since 1986. During his tenure the department has become one of the top departments in the U.S., according to rankings by *U.S. News and World Report* and by the National Institutes of Health. These dramatic accomplishments are a direct result of the wonderful faculty, staff, residents, fellows, postdoctoral students, graduate students, alumni, and benefactors that have together made the department what it is today.