

# THE REVERSE SHOULDER REPLACEMENT

The *Reverse Shoulder Replacement* is a newly approved implant that has been used successfully for over ten years in Europe. It was approved by the FDA for use in the U.S.A. in March of 2004. It is designed specifically for use in shoulders that have a deficient rotator cuff and arthritis or complex fractures, as well as other difficult shoulder reconstructions. It is sometimes a very useful option for revision of a failed prior joint replacement where the rotator cuff tendons are chronically torn and cannot be repaired.

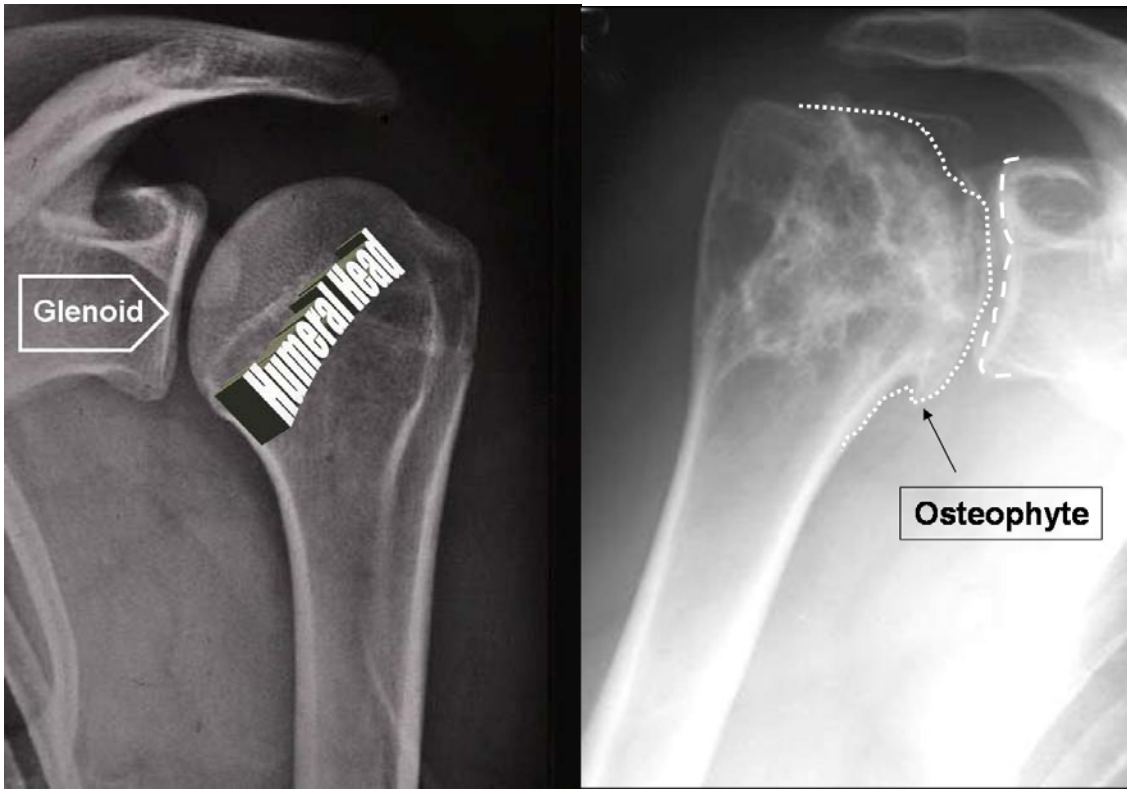
The *normal shoulder* is a ball and socket joint. The ball is called the humeral head and the socket is called the glenoid. (*See Figure 1a.*) In the *Arthritic shoulder* the normal cartilage (smooth surface of joint) is worn away and there is bone-on-bone without the normal smooth gliding surfaces, which are able to glide on one another with little friction and wear. The joint may also become irregular from boney growth (*osteophytes*), which is the body's attempt to "heal" the cartilage injury. (*See Figure 1b.*) Pain is usually due to the irregular joint surfaces rubbing on one another and from the inflammation of this wear and tear.

In the case of certain types of arthritis there can also be loss of the *rotator cuff tendons*. These are tendons, which encircle the humeral head (ball) and help to keep the humeral head in the glenoid (socket) when the arm is elevated. These tendons also help to rotate the humerus on the glenoid so the arm can be raised. (*See Figure 2*) Without normal function of the rotator cuff the humeral head may move upward out of the glenoid socket and it is then difficult or impossible to raise the arm up. If a *conventional joint replacement* is used in this situation, though there may be some pain relief the humeral head usually remains upward out of the socket and elevation of the arm is impossible. (*See Figure 3.*)

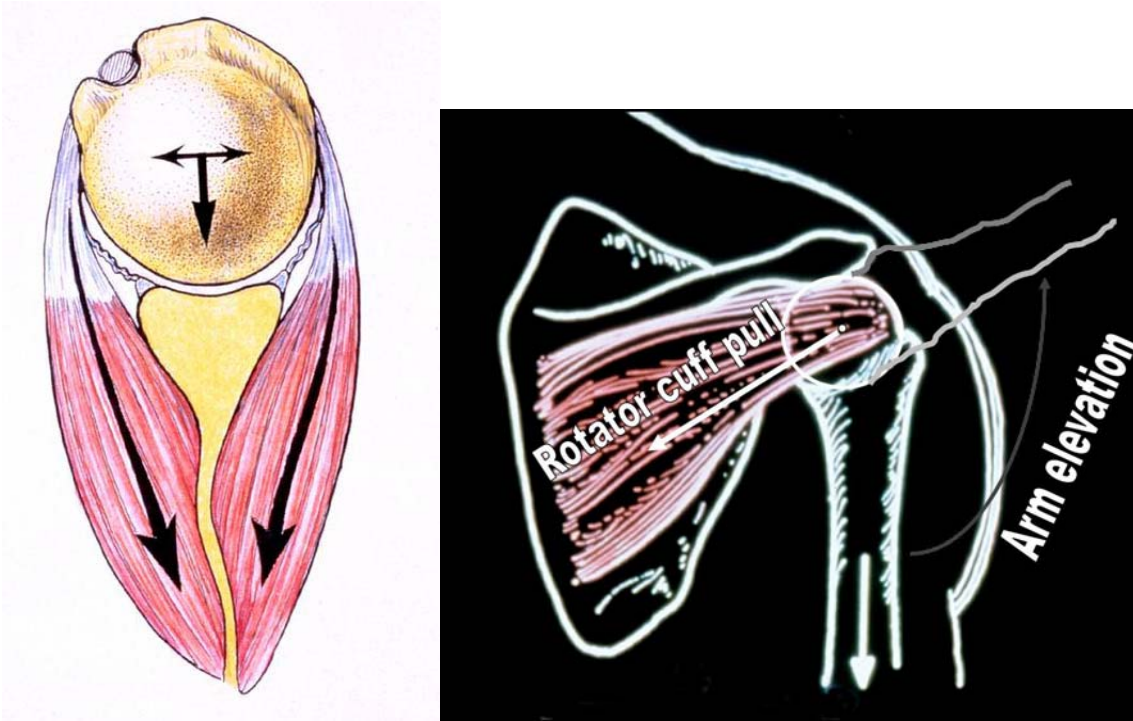
The *Reverse Shoulder Replacement* changes the orientation of the shoulder so that the normal socket (glenoid) now is replaced with an artificial ball, and the normal ball (humeral head) is replaced with an implant that has a socket into which the artificial ball rests. This type of design completely changes the mechanics of the shoulder and enables the artificial joint to function when the rotator cuff is either absent or when there is significant bone loss. (*See Figure 4.*)

**Figure 1a: NORMAL SHOULDER JOINT**

**Figure 1b: ARTHRITIC SHOULDER JOINT**



**Figure 2: ROTATOR CUFF FUNCTION:** The rotator cuff muscles compress the humeral head (ball) into the glenoid (socket) so the shoulder can rotate during motion. The rotator cuff also helps to raise the arm.



**Figure 3: Hemiarthroplasty for Arthritis with loss of the Rotator Cuff:** The patient is unable to raise her arm because the humeral prosthesis is dislocated upward out of the joint



## **INDICATIONS FOR THE REVERSE SHOULDER REPLACEMENT**

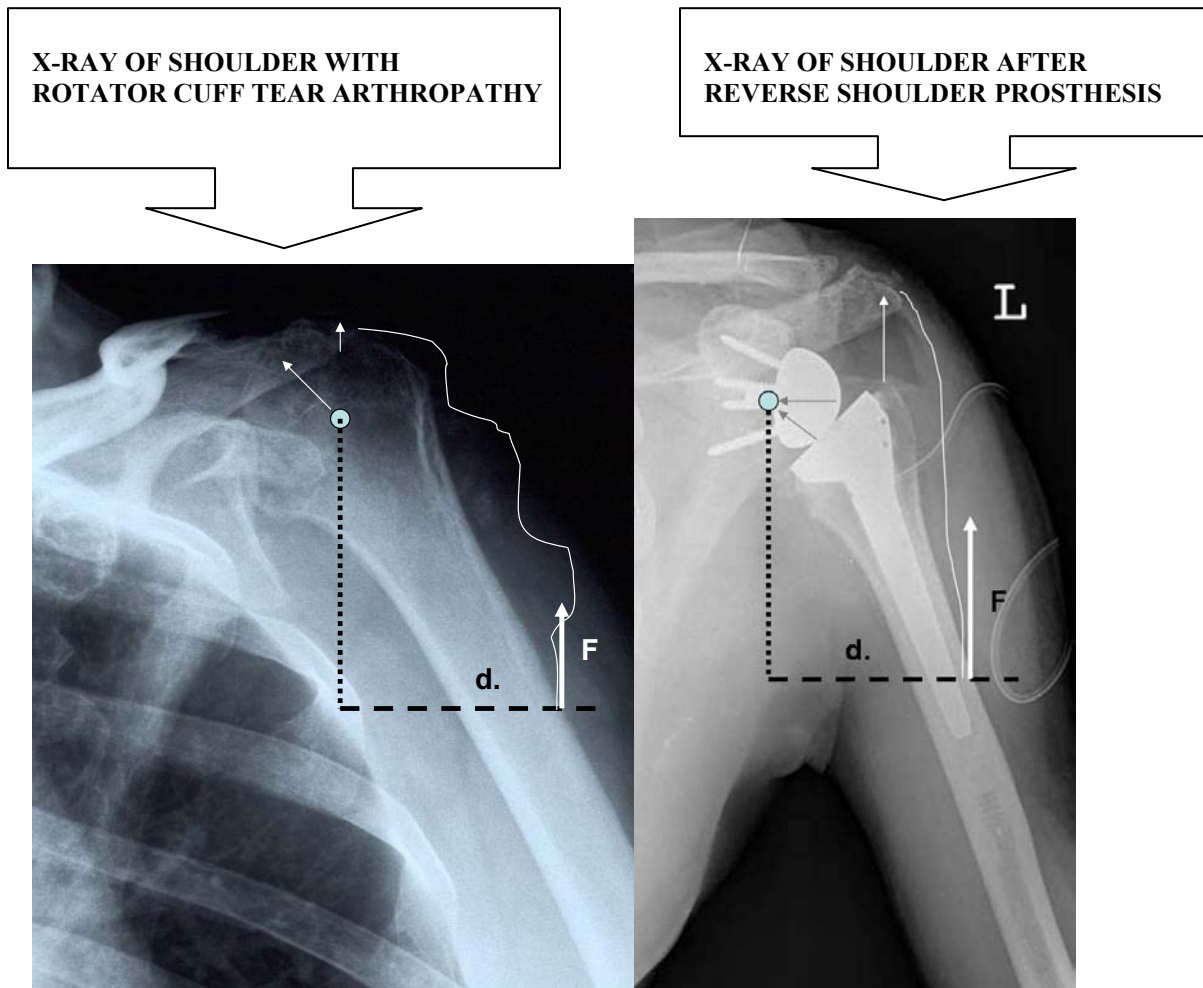
### **1. ROTATOR CUFF TEAR ARTHROPATHY**

*Rotator cuff tear arthropathy* is a complex shoulder problem that occurs when there is a large tear of the rotator cuff tendons that causes arthritis in the glenohumeral (shoulder) joint. In a normal shoulder, the rotator cuff tendons hold the humerus (ball) centered in the glenoid (socket). When there is a large tear, the humerus migrates upward and there is loss of cartilage (see [Figure 4](#)):

In this condition, a standard rotator cuff repair will not be effective because it will not help the arthritis, and a traditional shoulder replacement will not be effective because the shoulder will continue to be in a position upward out of the joint (see [Figure 3](#).)

A solution, which allows both pain relief and improved function, is the ***Reverse Shoulder Replacement***. This type of replacement corrects the arthritis by replacing the worn out joint surfaces with an artificial joint made of metal (cobalt chrome) and plastic (polyethylene). These materials have been in use for many years in traditional shoulder replacements as well as hip and knee replacements. (See [Figure 5](#)) Reversing the ball and socket changes the mechanics of the shoulder in order to improve active range of motion and strength. This is because the force of the deltoid is increased ( $F$ ) by moving the center of rotation of the joint inward (medially) and downward (inferiorly). The lever arm of the deltoid ( $d$ ) is increased, so this muscle has an improved mechanical advantage to raise the arm. (See [Figure 4](#)) The result is the patient can raise his (her) arm higher and even sometimes overhead.

**Figure 4: Mechanics of a shoulder with arthritis and loss of rotator cuff function.**



**The Center of joint rotation is marked  
(d.) Is the lever arm of the deltoid (leverage)  
(F.) Is the force of the deltoid**

**Figure 5: The Reverse Shoulder Replacement places the ball on the glenoid socket and the socket on the humerus. Since this reverses the normal geometry of the joint it is called a Reverse Shoulder Replacement.**



## **2. SHOULDER FRACTURES**

Some shoulder fractures are complex and involve the part of the bone where the rotator cuff tendon inserts (the greater and/or lesser tuberosity). In these cases the bone and tendons might not heal with a conventional repair using a metal plate and screws. Replacement with a conventional shoulder hemiarthroplasty may also fail due to tearing of the rotator cuff. In these situations a Reverse Shoulder Replacement may be a good treatment alternative.

## **3. COMPLEX PROBLEMS AND FAILED PRIOR SURGERY**

Some patients may have failure of a prior surgery, which results in loss of rotator cuff tendon function, and bone on the humerus or the glenoid. Examples include a failed shoulder replacement for fracture or for arthritis, and a failed rotator cuff repair. The reverse shoulder prosthesis offers the option to alleviate pain and also restore shoulder function in some of these difficult situations.

## **INDICATIONS FOR SURGERY**

- Painful rotator cuff tear arthropathy in older patient
- Failed fracture repair with loss of rotator cuff in older patient
- Failed prior shoulder replacement surgery

## **REASONS NOT TO DO SURGERY**

- Active infection
- Nerve injury affecting deltoid function
- Young patient with expectations for heavy use of shoulder

## **EXPERIENCE WITH REVERSE SHOULDER REPLACEMENT-**

### **What to Expect:**

This shoulder implant has been used in Europe for more than 10 years. While the experience there has been a very successful, some complications have been reported. Most patients report minimal or no pain after surgery and most are able to raise the arm much higher than before surgery. (See Figure 6) When this surgery is performed for difficult problems the complications rate may be higher than standard shoulder replacement. Complications can include the following:

- ✓ Infection
- ✓ Instability of the joint replacement
- ✓ Fracture of either the humerus or glenoid bone
- ✓ Nerve injury
- ✓ Loosening of the joint replacement
- ✓ Anesthesia problems

## **BEFORE SURGERY**

If you and Dr. Gobezie decide you are going to have surgery using a Reverse Shoulder Replacement, several steps are necessary before surgery:

1. You may need some special x-rays, a CT Scan, or an MRI
2. You may need to have a consultation with an anesthesiologist if you have a history of medical problems (i.e. heart disease, diabetes, asthma)
3. Your primary care physician or any specialist (cardiologist, etc) whose care you may be under should send Dr. Gobezie a summary of your medical conditions and an assessment of your readiness for surgery.
4. In some cases you may need to obtain an EMG (electromyography) study in order to determine if the nerves which make the muscles work properly in your shoulder, are indeed functioning normally.

## **YOUR HOSPITAL STAY**

The day of surgery you will arrive at the hospital two to three hours prior to your scheduled surgery to check in and be prepared by the anesthesiologist and nursing staff. It is important to follow the instructions given to you for the night prior to surgery. You should not have anything to eat or drink after midnight on the night before surgery. Your

primary care physician, or the anesthesiologist who you see before surgery will tell you whether or not to take your usual medications before surgery.

The surgery usually takes two to three hours, but in revision surgery settings may take longer. The time spent in the recovery room is usually an additional two to three hours. You then will be brought to a patient ward and the usual stay in the hospital is two nights.

Pain is usually controlled for the first 24 hours with intravenous narcotic medications such as morphine or Dilaudid (or other medication if you are allergic) through a ***Patient Controlled Analgesia (PCA)*** machine, which delivers the pain medication intravenously at your control. Based on your discussion with the anesthesiologist prior to surgery, you may also have a nerve block. This is given to you before surgery, and the pain relief, which this gives, may last well into the evening after surgery. You may have a catheter in your bladder in order to monitor your fluid output, and this is usually removed on the first day after surgery. Your intravenous line is also usually removed after the first day, and during the first day you will receive fluids, antibiotics, and other medications as needed through your intravenous line.

The day after surgery the ***PCA*** machine may be discontinued and you will begin taking pain medications by mouth. You will be discharged from the hospital with pain medications to take at home.

While a blood transfusion is rare, it may occasionally be necessary, so you may discuss donating your own blood in advance of surgery so it can be transfused if you need it after surgery.

When you are discharged from the hospital you will need someone to take you home. This can be a family or a friend. Some patients will need assistance at home, so family should be aware that you will need help with simple daily living chores such as dressing, cooking, and feeding yourself. In some circumstances it may be necessary to discuss going to a supervised rehabilitation facility for a period after surgery until you can begin actively using your operated arm.

## **PHYSICAL THERAPY**

With this form of joint replacement, stability and function are dependent upon healing of soft-tissues; therefore, Dr. Gobezie may or may not delay physical therapy. In certain instances, Dr. Gobezie will delay any therapy and ask you to keep your arm in the shoulder immobilizer for 6 weeks after surgery. After 7-10 days, you will be permitted to bathe in a shower and get your shoulder wet but you will need to keep your shoulder at your side with your arm hanging down or against your chest. You are permitted to use your other arm to wash and dress, but your operated arm should not be used for these activities until Dr. Gobezie indicates it is safe to do so. Usually, this is a period of three weeks after surgery. On occasion, Dr. Gobezie may allow immediate motion and use of the shoulder and arm.

After a period of immobilization determined by Dr. Gobezie, therapy may begin. This therapy program is usually divided into phases:

- Phase I: Pendulum exercises, passive motion performed by a therapist, active motion (in some cases). No strengthening or resistance exercises.
- Phase II: Active range of motion and use of the arm for daily living activities. No lifting of anything heavy. Continued stretching by a therapist and the patient is instructed in a therapy program they can do themselves.
- Phase III: Continue with stretching but now start strengthening.

#### **.FOLLOW-UP**

Ideally, Dr. Gobezie will want to see you about 10 to 14 days after surgery to check the healing of your incision. If you have traveled from a distance, it would be possible to have this visit with a local physician and then see Dr. Gobezie at the 6 to 8 week mark. Several x-rays will be ordered at your follow up visit. You should then follow-up periodically according to your needs and Dr. Gobezie's preference. Physical therapy and activity level will be advanced as described above and according to your progress.

#### **AFTER SURGERY**

It is important to be on the lookout for signs and symptoms of infection following surgery. These include: fever, chills, nausea, vomiting, diarrhea, redness around your incision, yellow/green drainage from your incision. Should you have any of these symptoms please contact your surgeon's office immediately.

You will need to take prophylactic antibiotics before dental procedures, colonoscopies or other invasive procedure. This consists of Amoxicillin 2 grams one hour prior to procedure. If you have a penicillin allergy you should take Clindamycin 600 mg one hour prior to procedure. Your dentist or Dr. Gobezie can prescribe this. You can call the office if you have questions about antibiotic therapy following your surgery.

## **Figure 6: Some Patient Stories:**



This is an example of a 68-year-old man 4 months after his Reverse Shoulder Replacement for his left shoulder rotator cuff tear arthropathy. Prior to surgery he could not raise his arm higher than his chest. He has no pain.



This is a 72-year-old woman with Reverse Shoulder Replacement on both sides. Six months after surgery she has no pain and can raise her arms over her head. Before surgery she had severe pain and inability to bring her hands higher than her mouth.