

## PATIENT GUIDE TO “REVERSE” PROSTHESIS

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### Why are these shoulder replacements called a “reverse” prosthesis?

Shoulder replacements are designed to remove portions of the bones of the shoulder joint that are arthritic (missing cartilage). (See The Patient Guide to Shoulder Replacements). The shoulder joint is a ball and socket joint, with a ball (or humeral head) that is part of the humerus and a flat surface (which is called the socket) which is part of the shoulder blade (Figure 1). In a standard shoulder replacement, the ball portion of the shoulder (the humeral head) is replaced by a metal ball and the socket is replaced by a plastic piece (Figure 2).

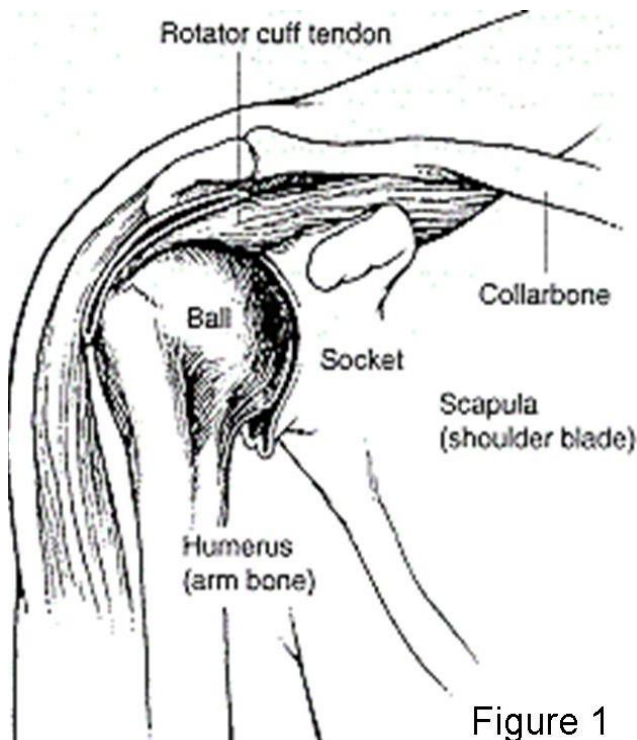


Figure 1

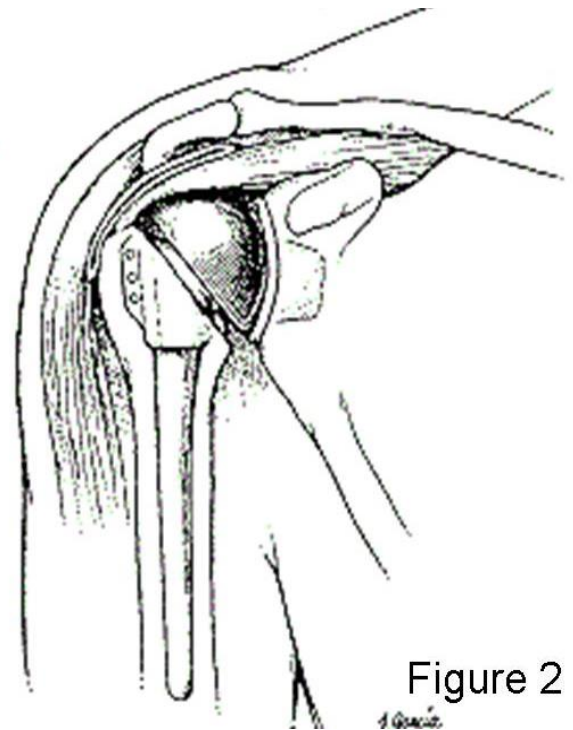


Figure 2

In the “reverse prosthesis” the shoulder joint is still replaced with parts or components made out of metal and plastic (Figure 3). The big differences between a “reverse” prosthesis and a standard shoulder replacement is that in a “reverse” prosthesis, the ball is placed on the socket side of the joint. This is opposite where it is located in nature, or “reverse” of what you would expect. The socket is then placed on the arm side where it is supported by a metal stem in the arm bone (the humerus) (Figure 4). Thus the ball and socket are “reversed” from what occurs in nature.

## How does it stay together?



Figure 3



Figure 4

Fortunately the reverse prosthesis can be put into place with screws on the socket side which hold it into the bone of the shoulder blade (Figure 3 and 4). The ball then screws into the plate which has been attached to the socket (Figure 3).

The part of the prosthesis placed into the arm bone is secured with cement which bonds the metal to the bone within a few minutes (Figure 4). The plastic socket piece then is press fit into the end of the stem where it is securely fixed by locking into the metal piece. This allows the socket to rotate on the ball so that the shoulder motion can be restored (Figure 5). The muscles around the shoulder also help keep the reverse prosthesis in place.



Figure 5

## Why should a person get a “reverse” prosthesis instead of a standard shoulder joint replacement?

A standard total shoulder replacement depends upon muscles and tendons around the shoulder joint to be intact. The muscles attach to the shoulder blade and turn into tendons which attach to the shoulder. These muscles and their tendons function to move the shoulder and are together called the “rotator cuff” (See Patient Guide to Rotator Cuff Disorders). When these tendons become extensively torn so that they do not attach to the bone any longer, the shoulder often does not function normally. The loss of the rotator cuff can produce pain and also loss of motion. A normal shoulder replacement is

designed to work only if those tendons are intact. In contrast, a “reverse” prosthesis is designed for situations where the rotator cuff is torn or malfunctioning.

### **What conditions in the shoulder warrant a “reverse” prosthesis?**

The main reason to consider a “reverse” prosthesis is when there is arthritis of the shoulder joint **and** the rotator cuff tendons are torn or gone. This is the most common surgical indication for a patient considering a “reverse” prosthesis. In this situation this operation will give the patient significant pain relief and may also help with range of motion of the shoulder. While range of motion after a “reverse” prosthesis may not be completely normal, it is typically improved over the motion previously lost due to the arthritis and pain.

Another reason to have a reverse prosthesis is if the rotator cuff tendons are all torn and one cannot lift the arm high enough to function. Typically in this case the shoulder is not painful but the inability to lift the arm is very disrupting to the ability to function in life. When the patient goes to lift the arm there is a prominence on the front of the shoulder, and this is called an anterior-superior migration or subluxation of the shoulder (See a Patient Guide to Anterior-Superior Subluxation) In these cases pain may or may not be a major factor for the reverse prosthesis, but the main reason for the replacement is to regain motion and function.

The third most common reason to have a “reverse” prosthesis is if the shoulder has already had a replacement prior to the time a “reverse” prosthesis was available and the patient still has pain and loss of motion. Sometimes the regular shoulder replacement was placed for a fracture or for torn rotator cuff tendons and the shoulder continues to be painful. In this case, if a reverse prosthesis is needed, the surgery to place a reverse prosthesis is a little more complicated. The reason for this is that the first, more traditional shoulder replacement has to be removed at the time of surgery, and the reverse can then be placed in the shoulder.

Other reasons to have a reverse prosthesis are some fractures of the shoulder area, particularly ones that involve the proximal humerus (arm bone) where the ball attaches to the shaft of the bone. In some instances the bone is broken into many pieces, or the ball may be split into parts.

The last reason to have a reverse prosthesis is because of a tumor in the proximal humerus that involves the bone of the shaft of the bone or the ball of the humerus itself.

### **What is the surgery like?**

The surgery experience is very similar to that of a regular shoulder replacement with a few variations. The main factor in the recovery is whether this is the first shoulder replacement for the shoulder or whether an old prosthesis has to be taken out during surgery. When this is done, it is called a “revision” case and the recovery may be different than when a first time (called a “primary”) joint replacement is done.

The surgery is typically done with a nerve block of the arm followed by a general anesthetic. The incision is in the front of the shoulder and the surgery takes about 2 to 3 hours. Postoperative pain relief is obtained with pain medications orally and by vein if needed. Most patients can begin moving the fingers, wrist and elbow the next day.

Whether shoulder motion begins the day after surgery depends upon how well the base plate and ball are fixed to the socket by the screws. In a reverse prosthesis there is some dependence upon the bone healing around the base plate and screws. As a result, movement of the shoulder may be halted for a few days to a few weeks. Despite these precautions, most patients are allowed to use their extremity to eat, read or use a keyboard within a few days after surgery. The amount the patient can lift the arm depends upon many factors and each patient is different. The amount of movement allowed by the patient after surgery also depends upon the fixation of the screws to the bone which can be determined at the time of surgery. Lastly, the amount of motion recovered after this surgery also depends upon how much motion the patient had prior to surgery.

Most patients donate a unit of blood prior to surgery which can be given back to them if needed. For first time joint replacements blood is given back to the patient usually only 10 to 20% of the time. For revision cases where the surgery is longer, nearly 80% need a blood transfusion. Similarly, the length of time for surgery is longer for revision cases (3 to 5 hours) and the recovery time for gaining function of the arm is longer. Other factors which influence the recovery time include whether bone grafting (adding bone where it is missing) is done, whether it holds well and how long it takes the bone to heal.

### **What results can I expect from a “reverse” prosthesis?**

The “reverse” prosthesis is very good at providing pain relief. Studies from Europe indicate that approximately 85-90% of patients who have this procedure obtain excellent pain relief. The degree of pain relief depends largely upon the reason the procedure was done. The degree of pain relief for revision cases is a little lower than for procedures done for the first time, and this is believed to be due to the scar formation and long term damage.

The “reverse” prosthesis also should restore some range of motion to the shoulder (Figure 6), but the degree of return is not as predictable as pain relief. Most patients obtain the ability to reach the top of their heads without the need to tilt their head. Most patients see improvement of motion in other directions, but if their rotator cuff is torn completely they may not see improvement in the ability to reach out to the side away from the body (called “external rotation”).

The long term survival rates (that is, how long it can stay in the shoulder before it starts to loosen and needs to have more surgery) of the “reverse” prosthesis have been



favorable. The “reverse” prosthesis has been used in France since the 1980’s but was approved by the Food and Drug Administration (FDA) in the United States in April of 2004. As a result, there are currently no long term studies of its use in the United States. However, the experience of shoulder surgeons and patients from Europe seem to indicate that the prosthesis will last 15 years about 90% of the time.

### **What are the potential complications of this procedure?**

The complications of this procedure are similar to those of joint replacements of any joint in the body. There are complications similar to those of regular shoulder replacements and a couple unique to this prosthesis.

The most common complication is that the humerus or arm portion (the socket) can become dislodged from the ball (the shoulder blade part) and the prosthesis is “dislocated.” Basically the two parts of the prosthesis are not connected anymore. This complication is more common with the reverse prosthesis than with regular shoulder replacements. Fortunately it can be managed usually by placing the arm back into the proper place and immobilizing the arm for a period of time. If the prosthesis continues to dislocate then sometimes further surgery is needed to tighten things up.

The second most common complication of concern after a “reverse” prosthesis is infection. This occurs rarely but if it does occur it can be frustrating for the patient and physician alike. Sometimes the infection can be controlled by surgery to wash out the joint and with antibiotics. If the infection becomes chronic despite treatment then there are options for solving the infection, but they largely involve further surgery.

Another complication of this prosthesis is that the arm portion can make contact with the bone of the shoulder blade in certain positions. This contact can create a groove in the bone of the shoulder blade that usually is not painful. Usually this complication does not require further surgery and can be controlled with avoidance of the arm positions and with medication.

Other complications are very uncommon but can rarely be seen with this prosthesis or with regular shoulder replacements. These include tingling, numbness and weakness if the nerves to the arm stretched during surgery. Injury to blood vessels is very, very rare but can happen particularly when there is a lot of scar and the patient has had multiple operations. Trouble with medical conditions, such as blood clots in the legs (deep venous thrombosis) which can travel to the lungs (pulmonary embolus), heart attacks, strokes, drug or anesthetic reactions can occur with any operation, but in our experience these are very rare after shoulder replacement surgery.

### **Who should not have a reverse prosthesis?**

There are only a few instances where a reverse prosthesis cannot be implanted. The first is if the socket bone (of the shoulder blade or scapula) is too far gone to allow the component base plate to be able to be fixed with screws to the bone. In some instances bone graft can be added at the time of surgery which makes it possible to place the base plate and screws, or bone graft can be added to allow placement of the base plate at a later date.

Patients with an ongoing infection in the shoulder should not have a reverse prosthesis. However, if the infection can be cleared up then a prosthesis can be inserted. Whenever a shoulder replacement is attempted in a shoulder that has had a previous infection, the post-operative infection rate is higher than if the shoulder never had an infection. This should be discussed in detail with your doctor prior to having this surgery done.

### **References and other resources**

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