

# THE REVERSE SHOULDER REPLACEMENT

The Reverse Shoulder Replacement is a newly approved implant that has been used successfully for over 20 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](#)). The cartilage (smooth surface of the joint) normally glide on one another with little friction and wear (like two sheets of ice). In the arthritic shoulder the normal cartilage is worn away and the joint becomes “bone-on-bone” without the normal smooth gliding surfaces. The joint may also become irregular from boney growth (osteophytes or “bone spurs”), which is the body’s attempt to “heal” the cartilage loss ([see figure 1b](#)). Pain is usually due to irregular joint surfaces rubbing on one another and from the inflammation of this wear and tear.



Figure 1a : NORMAL SHOULDER JOINT

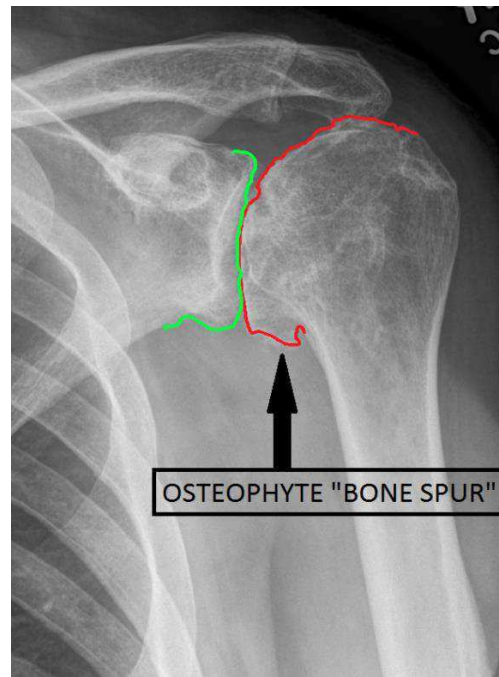
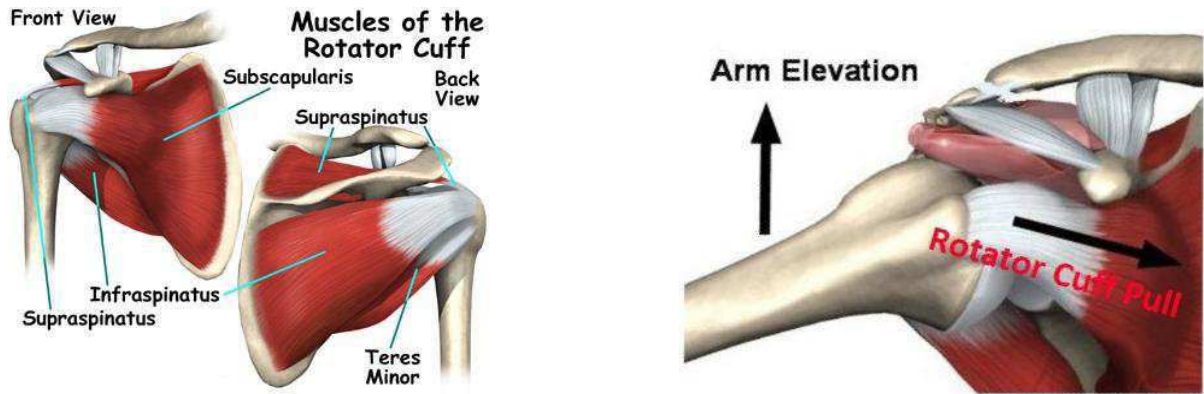


Figure 1b: ARTHRITIC SHOULDER JOINT

In the case of certain types of arthritis there can also be a loss of the rotator cuff tendons. These are a group of 4 tendons which normally encircle the humeral head (ball) and help to keep the head in the glenoid (socket) when the arm is raised. These tendons also help to rotate the humerus (arm) on the socket so the arm can be raised ([See figure 2](#)). Without normal function of the rotator cuff the humeral head may move upward and 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, pain may get better, but the arm will still remain up and out of the socket and it will be impossible to raise the arm.

**FIGURE 2: Rotator Cuff Function:** the rotator cuff muscles hold the ball in the socket so the shoulder can rotate during movement. The rotator cuff also helps raise the arm



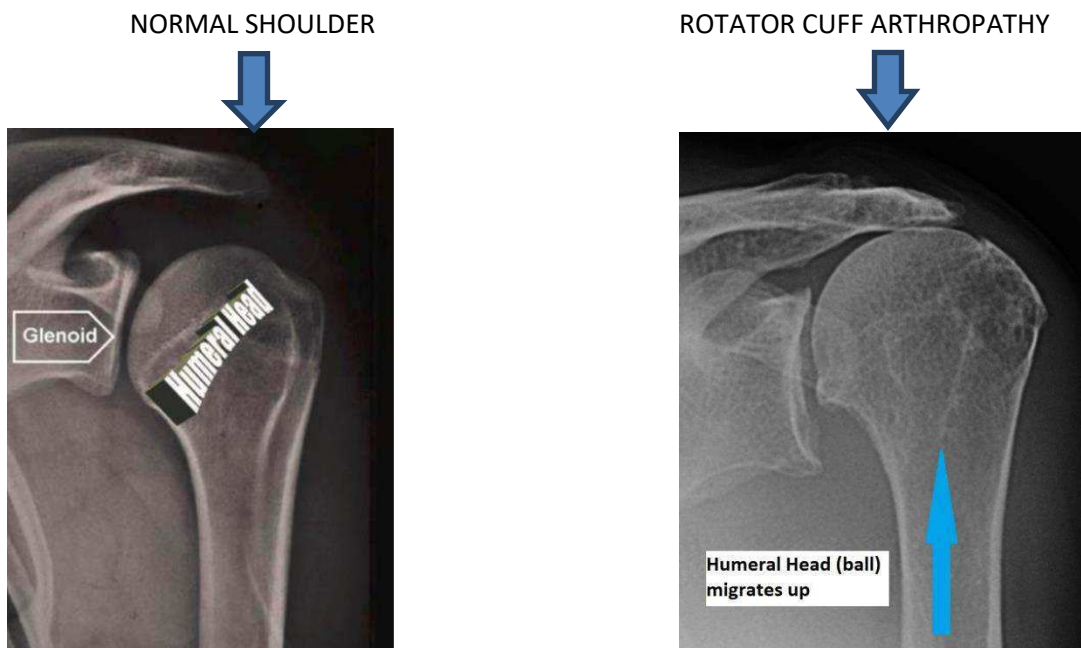
The Reverse Shoulder Replacement changes the orientation of the shoulder so that the normal socket (glenoid) now is replaced with an artificial ball, and the normal ball (humeral head) is replaced with an implant that has a socket where the artificial ball rests. This type of design completely changes the mechanics of the shoulder and allows the artificial shoulder joint to work even though the rotator cuff is no longer working or when there is significant bone loss.

**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 shoulder joint. In a normal shoulder, the rotator cuff tendons hold the humerus (ball) centered in the glenoid (socket). Where there is a large tear, the humerus drifts upward and there is a loss of cartilage and arthritis develops ([see Figure 3](#)).

**FIGURE 3: NORMAL SHOULDER COMPARED TO ROTATOR CUFF ARTHROPATHY**



In this condition, a standard rotator cuff repair will not be effective because it will not help the arthritis. A traditional shoulder replacement will also not be effective because the shoulder will not function properly because the muscles are still torn.

A solution which allows both pain relief and improved function is the Reverse Shoulder Replacement. This type of replacement takes care of the arthritis by replacing the worn out joint surfaces with an artificial joint made of metal (cobalt chrome) and plastic (polyethylene) (see Figure 4). These materials have been in use for many years in traditional shoulder, hip and knee replacements.

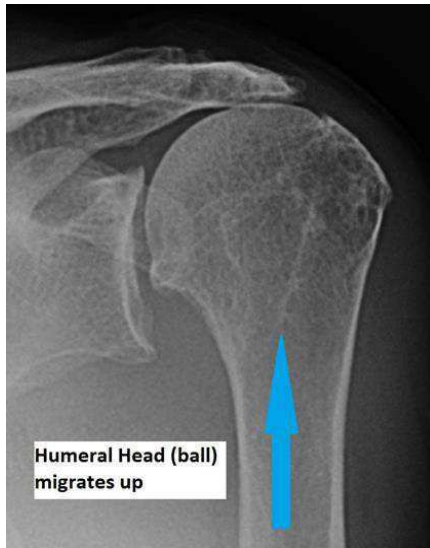
**FIGURE 4: REVERSE SHOULDER REPLACEMENT**



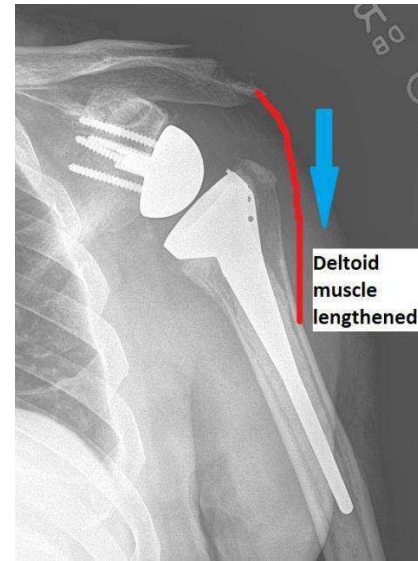
Reversing the ball and socket changes the mechanics of the shoulder in order to improve active range of motion and strength. This is because the force of the deltoid muscle is increased by moving the center of rotation of the joint inward (medially) and downward (inferiorly). The tension on the deltoid is increased, so this muscle has a better mechanical advantage to raise the arm ([See Figure 5](#)). The result is the patient can raise the arm higher and even sometimes overhead.

**FIGURE 5: Mechanics of a shoulder with rotator cuff tear arthropathy**

**Shoulder with rotator cuff tear arthropathy**



**Shoulder after 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 lesser tuberosity). In these cases the bone and tendons might not heal with a conventional plate and screws. Replacement with a conventional partial shoulder replacement by only the replacing the humeral head (ball) 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 (ball) or the glenoid (socket). Examples include a failed shoulder replacement for fracture or 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.

### REASONS NOT TO DO SURGERY

1. Active shoulder infection
2. Nerve injury affecting the deltoid muscle
3. Young patient with expectations for heavy use of the shoulder

### WHAT TO EXPECT WITH THE REVERSE SHOULDER REPLACEMENT

This shoulder replacement has been used in Europe for more than 20 years. While the experience has been 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 complication rate may be higher than a standard replacement.



**FIGURE 6: Patient a Reverse Shoulder replacement on the left shoulder**



COMPLICATIONS can include the following

1. Infection
2. Instability of the joint replacement (it can dislocate)
3. Fracture of either the humerus (arm) or glenoid (socket)
4. Nerve injury
5. Loosening of the joint replacement
6. Anesthesia problems

BEFORE SURGERY

If you and Dr Muh decide you are going to have surgery with a Reverse Shoulder Replacement, several steps may be necessary before surgery:

1. You may need some special xrays, a CT scan and possibly a MRI
2. You may need to see your primary care physician if you have a history of medical problems (high blood pressure, diabetes, asthma, etc). They may need to draw some blood.
3. 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 functioning normally