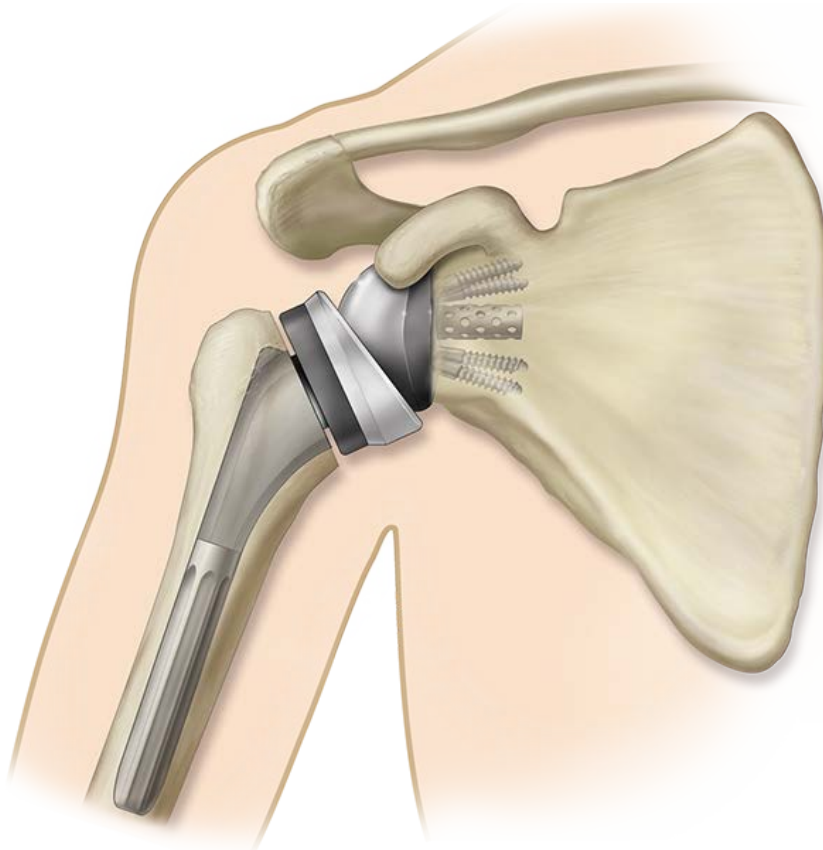


# Patient Guide to Reverse Shoulder Replacement



THE  
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**About this guide**

This booklet provides valuable information for you and your family or friends regarding your reverse shoulder replacement surgery. You can expect the best results if you read and discuss this guide with your family or friends before your surgery. The goals of our team are to restore your shoulder to a painless, functional state and to make your hospital stay as beneficial, informative and comfortable as possible. Please feel free to ask questions or share concerns with any of your caregivers.

**Excellence, Experience and Leadership in Shoulder Replacement**

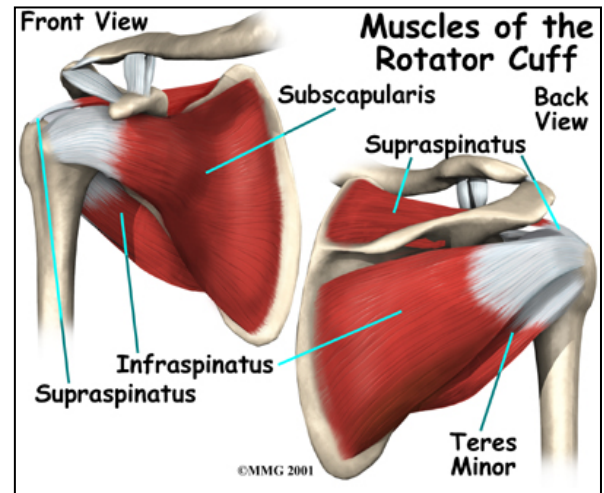
We are pleased that you have chosen to entrust the care of your shoulder disorder to our expert team. As one of the many specialized joint replacement services we offer, our shoulder replacement program features a comprehensive approach to patient care from an interdisciplinary group of health-care professionals dedicated to restoring your quality of life and well-being.

While most orthopedic surgeons do only 2-4 shoulder replacements yearly, Dr. Parsons performs 80-90 replacements a year including complex revision cases. Dr. Parsons was the first orthopedic surgeon in New Hampshire to perform a reverse shoulder replacement shortly after their FDA approval in 2004. Since that time, he has done more reverse shoulder replacements than any other surgeon in New Hampshire.

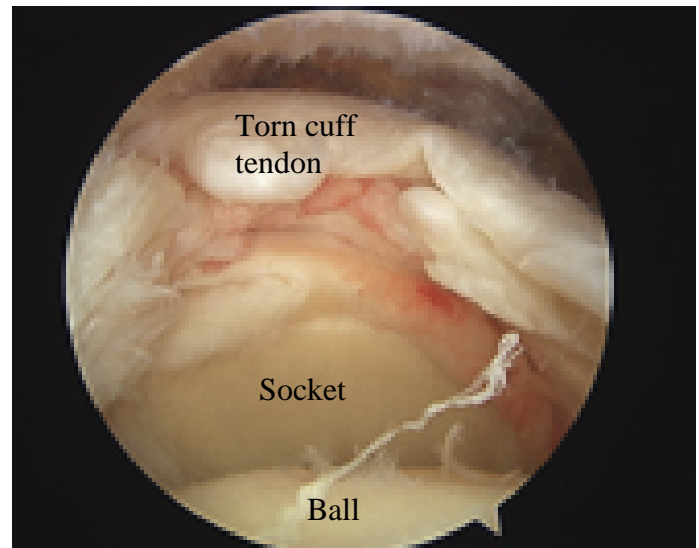
Having studied under pioneers and world leaders in shoulder surgery, his extensive training in this field provides a foundation of experience and excellence that you can trust. Dr. Parsons has lectured widely in this field and participated in the design of reverse shoulder implants and surgical procedures to improve shoulder replacement outcomes. With this background, we can offer our patients the most up-to-date and innovative techniques to permit a more rapid and fuller recovery. From advancements in the surgery, the implants, pain management and rehabilitation, we have refined the process to bring you the safest, and best quality care.

## Summary:

The shoulder is a ball and socket joint that allows the arm to be placed in an incredibly wide range of positions during every day activities. The ball is formed by the head of the humerus (arm bone), and the socket is formed by the scapula (shoulder blade). The surfaces of the ball and socket are formed by cartilage, a tissue which allows joints to glide in a smooth and frictionless way. The rotator cuff is a group of 4 tendons that attach around the margin of the ball as shown in the picture to the right. Together these muscles and tendons help center the ball in the socket to provide the shoulder with stability during a wide range of motion. The rotator cuff also powers movements like arm elevation, rotation away from the body and reaching around behind ones back.



Rotator cuff tears are common and may occur either from injury or from age-related degeneration. Most tears begin in the supraspinatus tendon. Over time, however, tears tend to enlarge and extend into the infraspinatus and teres minor tendons. As tears enlarge, the tendon may retract away from its insertion creating a large defect above the head of the humerus. The picture the right shows an arthroscopy view of a massive rotator cuff tear. As can be seen, the tendon is retracted to the level of the shoulder socket creating a large hole above the ball.

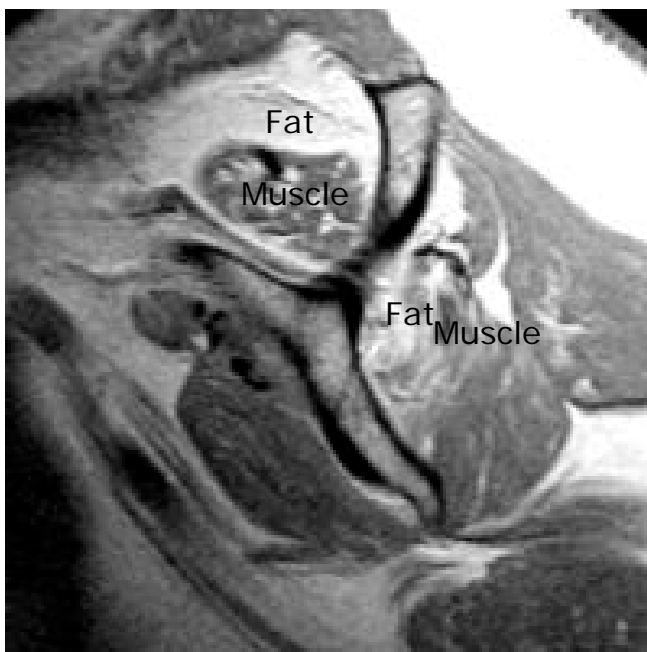


As the hole created by the tear enlarges, the humeral head can herniate through the tear. As a result, the ball no longer sits properly in the socket and wear of the top part of the socket may develop causing pain and arthritis. This type of arthritis is called cuff tear arthropathy.

The X-rays of a shoulder with cuff tear arthropathy show bone-on-bone involving the ball and socket as well as the ball and undersurface of the acromion bone. There is rounding of the head of the humerus as is shown on the picture to the right. To the far right is a more severe case showing destructive changes to the ball, severe erosion of the top of the socket and severe upward migration of the ball relative to the socket.



Along with bony changes, the muscles of the torn tendons will also atrophy which means they shrink in size and ability to generate power. As atrophy progresses, the muscles undergo a process called fatty degeneration where the muscle fibers themselves get replaced by fat. The MRI pictures below show early atrophy and fatty replacement on the left. Muscle is normally gray in appearance while fat is white. The picture on the right shows near complete replacement of the rotator cuff muscles by fat. This process is not reversible once it reaches a certain severity. In these cases, repair of the tendon with return of function is impossible.

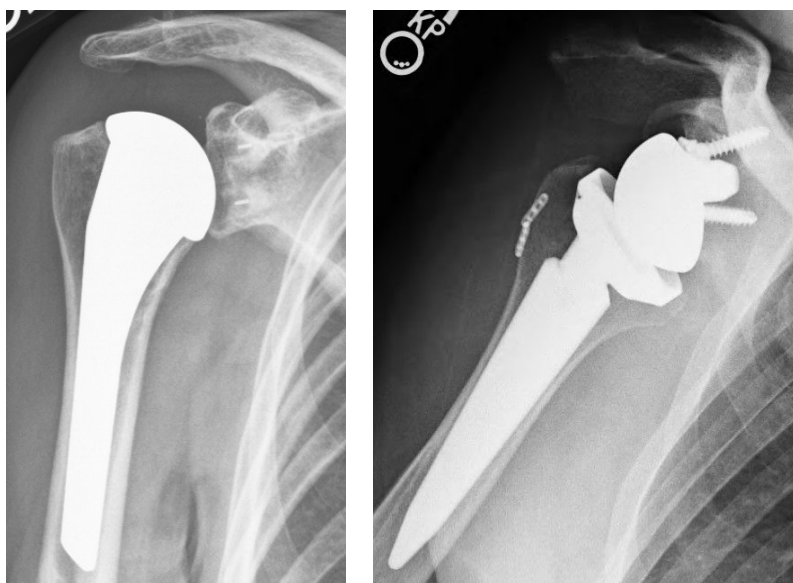


While some patients may still be able to raise their arm with a large rotator cuff tear, others develop a condition called pseudoparalysis where they lose all ability to actively elevate the arm. This is shown in the picture below. This is an extremely disabling condition, particularly when the dominant shoulder is involved. In the severest cases, tears may become so large that the humeral head actually dislocates from the socket – a condition called antero-superior escape.

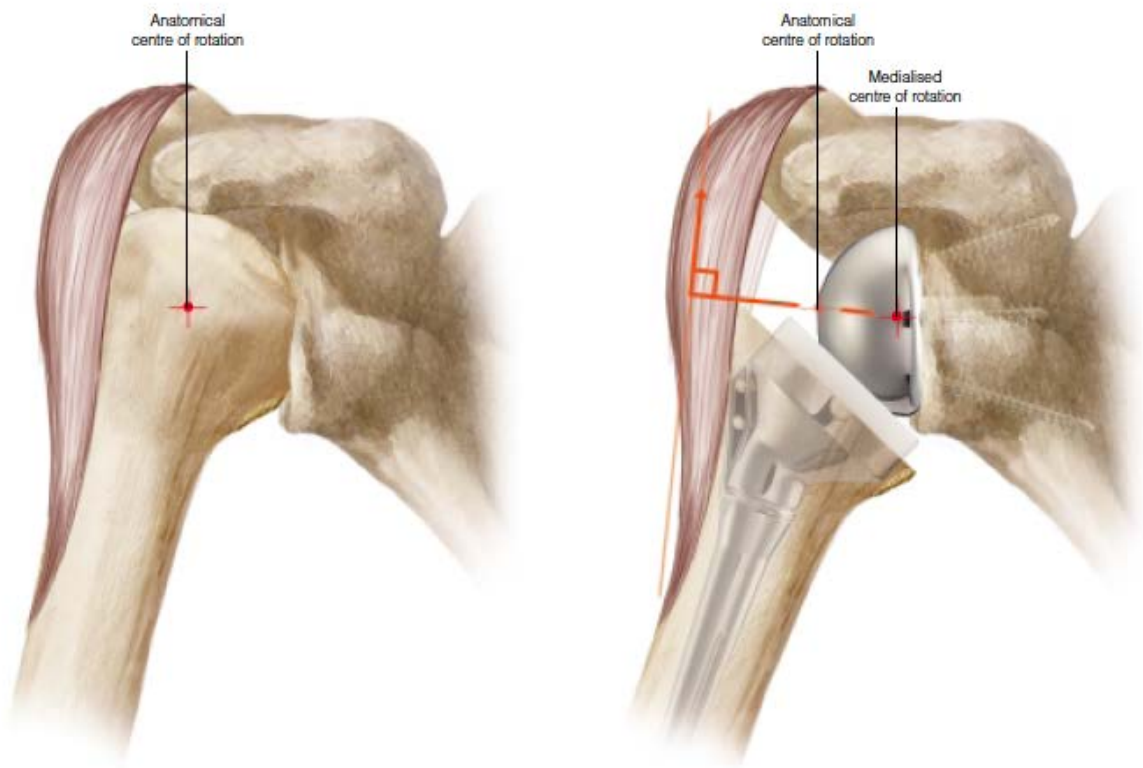


Because standard shoulder replacements still rely on the rotator cuff for stability and strength, they cannot be used to treat the arthritic shoulder with a deficient rotator cuff. When patients lose the ability to elevate the arm in the setting of an irreparable rotator cuff tear, the reverse shoulder replacement is the only reliable and predictable long-term solution proven to restore comfort and function.

This prosthesis is called a reverse replacement because it reverses the relationship between the ball and the socket. The x-rays to the right compare a standard shoulder replacement (left) to a reverse replacement (right). As you can see, in the reverse prosthesis, the ball is attached to a metal base plate that is screwed onto the native shoulder socket. The stem inside the humerus bone contains a plastic insert that forms the socket.



This reversed configuration restores stability by creating a more constrained ball and socket; and it restores strength by improving the mechanics of the deltoid muscle. This is accomplished by shifting the center of rotation of the joint inward toward the shoulder blade. The effect of this shift is to lengthen the lever arm of the deltoid muscle thereby improving its mechanical advantage. These changes, which are depicted below, enable patients to raise the arm effectively without a rotator cuff.



The picture below shows a patient before and after a reverse shoulder replacement. It is important to note that the reverse prosthesis is designed only to restore elevation of the arm, which is the primary function of the deltoid muscle. Unfortunately, these prostheses are not able to restore external rotation power to the arm (the ability to rotate the arm away from the body). Often patients may have a rotator cuff tear that extends into the external rotator tendons (infraspinatus and teres minor). These tears result in significant external rotation weakness that may persist after reverse shoulder replacement despite significant improvements in one's ability to raise the arm in front of the body.



### Indications for Surgery

When the symptoms of rotator cuff tear arthropathy begin to interfere with activities of daily of living and negatively impact one's quality of life, joint replacement surgery may be considered. Reverse shoulder replacement is the most reliable solution when this condition has failed to respond to a program of rest, flexibility and strengthening exercises, anti-inflammatory medications and cortisone

injections. The main indications for this procedure are ***pain and severe weakness*** in the setting of an irreparable rotator cuff tear and arthritis.

Reverse shoulder replacement is also used to fix other problems related to the shoulder such as in revision replacement cases where a previous standard shoulder replacement has failed. Reverse shoulder replacement is also gaining increasing popularity in treating severe osteoarthritis with bone wear and severe fractures of the upper humerus that are not possible to fix with standard implants like plates and screws. Historically, these fractures have been treated with a partial standard shoulder replacement but the results of this procedure are often unsatisfactory. The reverse prosthesis offers these patients improved comfort and function after appropriate healing and rehabilitation.

The following sections will describe in greater detail the surgical procedure, the recovery period and the expected long-term outcomes after reverse shoulder replacement surgery. We will also discuss the potential risks and complications, and long term restrictions.

## **Considering Surgery**

### *Are there other surgical options?*

When severe pain and weakness result from a rotator cuff tear that is beyond repair or a chronic rotator cuff tear with resultant arthritis, the reverse shoulder replacement is the most effective and reliable solution to restore function and relieve pain. Clean-up operations done with an arthroscope tend not to be effective in these cases as they are unable to address the worn joint surfaces or the weakness from a chronic tear. Although some patients may get short-lived pain relief from an arthroscopic debridement, there is usually no improvement in function and long-term results tend to deteriorate over time. Attempts to fix the rotator cuff in cases where there is severe tendon retraction, advanced muscle atrophy, significant fatty infiltration and poor tendon quality have an extremely high failure rate. Attempts to augment the tendon repair with tissue patches, tendon grafts or muscle transfers have generally not proven reliable in these cases either, and these procedures also have a high failure rate.

### *Who should consider reverse shoulder replacement?*

This procedure is considered when:

1. the pain and weakness become a major problem that negatively impacts one's quality of life,
2. one is sufficiently healthy to undergo the procedure,
3. one 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 the technique of shoulder replacement.

### *What happens without surgery?*

The natural history of cuff tear arthropathy and arthritis is that it usually continues to progress over time. The rate of progression varies between individuals and is unpredictable. Sometimes the pain and weakness will stabilize at a level that is acceptable and manageable to the patient. In general, this surgery is elective, and can be performed whenever the patient decides that the shoulder has become



disabling enough to warrant treatment. In the case of cuff tear arthropathy delaying surgery typically does not compromise the success of surgery in the future. There are certain cases however where erosion of the socket from arthritis wear can become so severe that replacement becomes technically more challenging and less predictable. In these cases, earlier surgery may improve outcomes by reducing the complexity of the reconstruction. Patients with some preservation of external rotation power from an intact posterior rotator cuff may also have improved function after surgery. Delay in surgery in these cases may result in eventual tear progression that may negatively impact one's ability to rotate the arm away from the body after the reverse shoulder.

### *Effectiveness*

Reverse shoulder replacement for cuff tear arthropathy and irreparable rotator cuff tear has proven an effective means of restoring lost comfort and function to the shoulder. One must recognize, however, that certain limitations in mobility and strength may persist following surgery, especially in those with severe deficits in function prior to surgery. This is because the muscles, tendons and ligaments around the shoulder joint may be contracted or atrophied from the arthritis process. Some of these changes may not be reversible with surgery.

There are several factors that influence the effectiveness of surgery and must be considered in light of the decision to undergo shoulder replacement:

1. *Preoperative Function:* the stronger the deltoid muscle before surgery, the stronger after surgery. Patients with significant deltoid weakness will take longer to improve in terms of ability to actively elevate the arm. Similarly, those patients with some preservation of external rotator function due to remaining intact posterior rotator cuff, are likely to have better ability to position their arm after surgery. Some patients will never regain certain movements that require external rotation if these tendons are irreparably torn before the replacement.
2. *Patient expectations:* if patients have unrealistic expectations about activities or vocations to which they can return following reverse shoulder replacement, they will likely be dissatisfied with the process. If one is unwilling to give up activities that may jeopardize the long-term function and survival of the artificial components, replacement surgery should not be considered.
3. *Compliance with the rehabilitation:* a good operation is only half the battle. Participation in a structured rehabilitation and adherence to a home exercise program are essential to recovery of motion, strength and function. Shoulders do not recover on their own, and patients must take a responsible and active role in the process. Thus, the patient's motivation and dedication are important elements of the partnership.

In general, 80-90% of patients report good to excellent outcomes following reverse shoulder replacement surgery. Relief of grinding arthritic pain is highly predictable and successful as is improvement in one's ability to raise the arm in front of the body.



### *Urgency*

Shoulder replacement surgery is an elective procedure that can be scheduled when circumstances are optimal for the patient. It is not an urgent procedure. The patient has plenty of time to become informed about the process of surgery and recovery.

Factors that the patient should consider in choosing the optimal time include the following:

1. The pain and weakness have become sufficiently disabling to impair the performance of daily activities. Patients who are still able to sleep comfortably and manage daily activities may and probably should consider waiting;
2. A planned period of time can be dedicated to the recovery and rehabilitation process that will not interfere with other scheduled events;
3. Overall health and nutritional status are optimal and will not limit the ability to comply with the performance of rehabilitation;
4. Motivation and readiness to undertake the process of surgery, recovery and rehabilitation is a priority.

### **Preparing for surgery**

Preparation for reverse shoulder replacement begins several weeks before the surgery itself.

#### *General health*

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 to maximize the body's healing potential. 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. If patients take blood-thinning medications such as Coumadin or Plavix, they should check with their primary care physician about the safety of stopping their use 5-7 days prior to the procedure. These medications can usually be resumed the day following surgery.

#### *Medical clearance for surgery*

Medical clearance for surgery by a patient's primary care provider is a necessity to ensure preoperative readiness and plan for any postoperative management issues such as blood pressure and glucose control (diabetics). Depending on one's health status, this may include testing such as an electrocardiogram, chest x-ray, bloodwork and sometimes further heart testing like an echocardiogram or stress test.

#### *Dental clearance*

To avoid the risk of infection, it is critical that any dental issues be taken care of before joint replacement. If you have not seen a dentist for more than 6 months, you may be asked to have a

dental exam as cavities, tooth abscesses and gum disease can pose a risk of joint infection after a shoulder replacement.

#### *Plan ahead for discharge*

It is best to begin making necessary preparations for aftercare before surgery. Most patients following a reverse shoulder replacement can be discharged safely to home. For individuals who live alone or those without readily available help, arrangements for home help during the early recovery period should be made in advance.

Some patients will benefit from a stay in a rehabilitation facility for a period after the surgery until they are sufficiently recovered to manage with daily activities. Patients may consider visiting these centers before surgery to decide which one might be best in terms of proximity to family and friends.

#### *The day before your surgery*

You will receive a telephone call in the late afternoon or early evening of the day before your surgery giving you instructions on what time to arrive at the hospital and where to go. Your arrival may be scheduled for as early as 6:00 AM if yours is the first case of the day. It is critical to arrive on time so that the surgical schedule does not get delayed.

You may eat normally on the day before surgery but do not drink alcohol as this may heighten the risk of anesthetic complications such as nausea and vomiting. **DO NO EAT ANYTHING AFTER MIDNIGHT.** You may drink clear liquids up to 2 hours prior to surgery. Do not drink any dairy products (no cream in coffee). The only exception is if your doctor specifically instructs you to take medication with a sip of water.

You will be instructed to buy a bottle of Hibiclens antibacterial soap. Use this daily for 3-5 days prior to surgery including the morning of surgery. Let this sit on your skin for 2 minutes before rinsing off. Use a clean towel to dry off.

*The day of your surgery:* You may brush your teeth and rinse your mouth without swallowing any water. Wear comfortable, loose-fitting clothing and non-slip shoes. Valuable items should be left at home. Leave your own prescription medications at home as the hospital will provide you with these during your stay. Bring an up-to-date list of your current medications to the hospital to ensure that you receive the proper dosage and frequencies. If you wear contact lenses, it is better to bring eyeglasses to the hospital. Also be sure to bring a photo identification card, important telephone numbers for emergency contacts, and a book or magazine.

Once you arrive at the hospital you will be registered and given a room in the Preoperative Suite. Your family members may accompany you until you are taken to the preoperative holding area just before the operation. During this time, you will be given a gown to wear while your own clothing and possessions are safely stored. Your medications will be reviewed by the nursing staff and an IV will be started. The anesthesiologist will also meet with you to discuss any pertinent medical history and review their plans to keep you asleep and comfortable during the procedure. During your operation, your family and friends can wait in the day surgery waiting area or can go to other areas of the hospital. Pagers are provided to alert them when the surgery is finished so they can return to the

waiting area to meet with the surgeon. Family and friends may also leave the hospital grounds and provide a contact phone number so they may be called after the case.

## About the surgery

### *The surgical team*

Reverse shoulder replacement surgery 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. While most general orthopaedic surgeons perform 1-2 hip or knee replacements a month, the average surgeon may only perform 1-2 shoulder replacement per year. Dr. Parsons is extensively trained in these procedures, having performed advanced specialty training in the field of shoulder surgery in one of the busiest shoulder replacement centers in the country. This included training in the management of complex and failed shoulder replacements. Our surgical team includes dedicated staff experienced in performing these procedures and we carefully select our implants based on the best products available for individual cases. We currently perform more shoulder replacements than any other facility in New Hampshire (about 80 per years) and performed the first reverse shoulder replacement in the state. We have refined our techniques and rehabilitation programs to expedite recovery and achieve the best possible outcome.

### *Anesthetics*

Reverse shoulder replacement surgery is performed using a combination of an interscalene nerve block, a general anesthetic and a long acting local anesthetic. The nerve block is placed in the preoperative holding area immediately prior to surgery and provides pain relief for 8-12 hours after surgery. During this time you will not have control over the arm and it is kept in a sling until you regain movement. General anesthesia is then used to induce a sleep state during the procedure. The nerve block reduces the amount of general anesthesia necessary to keep patients asleep which facilitates a quicker recovery with fewer side effects. Throughout the operation, you will be closely monitored including heart rate, blood pressure, and oxygen level, body temperature. The local anesthetic works for 72 hours after the block wears off and provides lasting pain control.

### *Technical details*

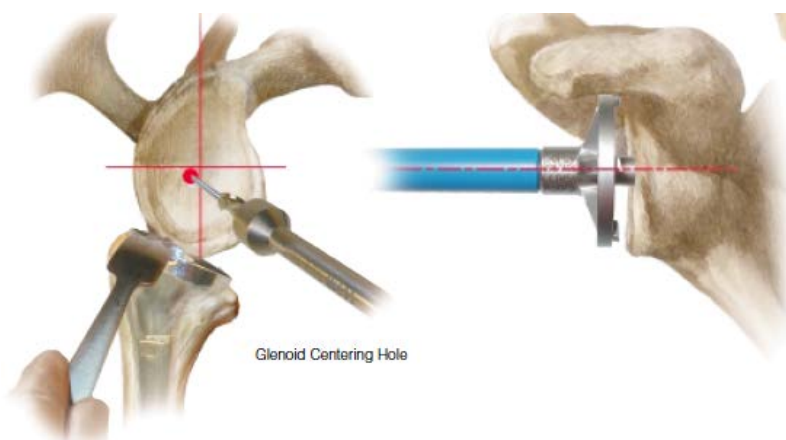
After the anesthetic has been administered and the shoulder is prepared, a 4-5 inch incision is made across the front of the shoulder. This incision allows access to the joint without damaging the important deltoid or pectoralis muscles that are responsible for a significant portion of the shoulder's power. In some cases, the incision may be made over the top of the shoulder. This may be the case when patients have had prior open rotator cuff surgery with a pre-existing incision.

The muscles and other tissues near the shoulder are mobilized by removing any scar tissue that may restrict their motion. The subscapularis tendon is mobilized with a fleck of bone to gain access to the joint. The arthritic humeral head is resected along with the bone spurs that surround it. This cut must be carefully planned and oriented to recreate one's anatomy with the reconstruction. The humeral implant is



chosen by trialing different sizes and selecting the one that best matches the patient's anatomy. The top part of the humerus is reamed and shaped to accept the shape of the implant.

The arthritic glenoid is then exposed removing all bone spurs from its periphery. Adequate exposure is a challenging process, and the surgeon must be familiar with the location of important nerves and blood vessels. A special reamer is used to refine the glenoid surface in preparation for the prosthesis. Reaming corrects the shape and orientation of the socket, both of which are affected by arthritis.



A central hole is then drilled, and the metal baseplate is then impacted onto the reamed surface. Depending on the implant type, between 2 and 5 screws are then inserted to help anchor and stabilize the baseplate during the healing process. Different prostheses have different screw and peg designs and based on a specific patient's anatomy, bone quality, size and other factors, a specific prosthesis will be tailored to the individual case.



Once the baseplate is fixed to the bone, the ball (also called the glenosphere) is then impacted onto the plate and secured with an additional screw. Trial socket inlays are then placed into the top of the humeral prosthesis and the ball and socket are then relocated. Stability and tension are checked by taking the arm through a range of motion. The thickness of the socket can be varied to achieve the appropriate tension that ensures stability. The final socket prosthesis is then snapped into the humeral component. A drain is placed which is removed on the morning after surgery. This prevents blood from collecting in the wound.

X-rays are then taken in the recovery room to ensure proper prosthesis placement and sizing.



### *Length of 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 1-2 hours in the recovery room.

### *Risks and potential complications*

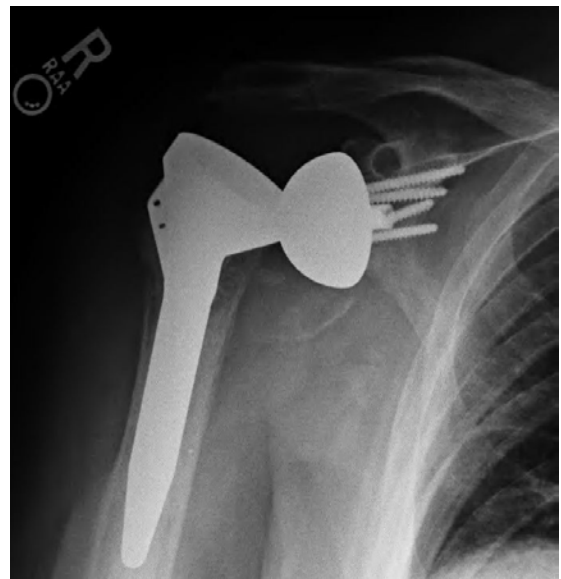
Complications related to shoulder replacement surgery can be divided into those that occur during surgery, those that occur soon after surgery and those that occur at a time remote from the surgery

- Complications that occur soon after surgery include:

1. Wound infection is the main problem that can occur in the early recovery period, generally between 1-3 weeks. Symptoms include fever, weakness, fatigue and nausea. Signs include redness, swelling and wound drainage. If infection is diagnosed and treated early, it can be managed by an irrigation and debridement operation with preservation of the replacement. If however, the infection is long standing, the artificial components may have to be removed and a staged reconstruction performed after thorough antibiotic treatment.
2. Stiffness can occur secondary to scar tissue that forms between tissue layers. Generally, with a properly conducted physical therapy program, this is not a problem. However, some patients have an overactive healing response and stiffness may be unavoidable. Stiffness may require a manipulation under anesthesia if further physical therapy cannot improve the range of motion.

- Complications that occur remote from surgery:

1. Instability: dislocation of a reverse prosthesis is uncommon but may happen if the arm is stressed in certain positions. The most at risk position is the when the arm is at the side and slightly behind the body as when pushing one's self up from a seated position. If dislocation occurs, the shoulder can usually be relocated without an open surgery. The arm is then placed in a sling for several weeks to allow the tissues to "tighten up." If recurrent dislocations occur, revision surgery with placement of a thicker insert, deeper insert and/or larger sphere is necessary.



2. Late infections may occur by spreading to the shoulder from a different source such as the urinary tract, a tooth abscess, or other breaks in the skin. For this reason, we generally recommend that prophylactic antibiotics be taken prior to any invasive procedures such as dental work, colonoscopy, etc...

## **When you return home**

### *General Information*

You should try to return to normal eating and sleeping patterns as soon as possible and be sure to get ample rest while your body recovers from surgery. Proper nutrition including foods rich in protein and fiber are important for wound healing and avoiding constipation. If you smoke, every effort should be made to reduce or stop nicotine consumption for the first several weeks as it impairs wound healing. Patients with diabetes should also make every effort to keep blood sugars under good control as high or fluctuating blood sugars raise the risk of infection and slow wound healing.

### *Care of the incision*

The surgical incision should be kept clean and dry until you are seen back in the office. The dressing placed at surgery can stay on for a full week and you may shower 6 hours after the drain is removed on postoperative day 2. Full immersion underwater such as with swimming should wait until 3 weeks after surgery to ensure the incision is fully healed. Some swelling and discoloration in the arm is normal. You can elevate the arm by lying flat and placing the arm over a pillow on your chest. This will allow some of the fluid to drain out of the arm.

### *Pain management*

You will be sent home with prescriptions for the pain medications that have proven effective for you in the hospital. They should be supplemented with Tylenol, Ibuprofen and Tramadol which can be taken either at the time of the pain medication or between pain medication doses. It is critical not to exceed a total of 3000mg of Tylenol daily or you could sustain liver damage. Each Extra Strength Tylenol pill contains 500mg so this would equal a maximum dose of 2 pills every 8 hours or 1 pill every 3 hours. Regular Tylenol pills contain 325mg which would equate to a maximum dose of 2 pills every 6 hours or 3 pills every 8 hours. Be aware that some pain medications such as Percocet and Vicodin may already have Tylenol in them. Check with your pharmacist if this is the case as supplemental Tylenol would risk exceeding the daily maximum dose.

Nonsteroidal anti-inflammatories can also be used judiciously in the postoperative period and are safe to take in combination with pain medications and Tylenol. These include medications like Ibuprofen, Advil, Motrin, Naproxen, Naprosyn, Aleve, Celebrex, Relafen, Mobic and others. These medications are generally safe but if taken for prolonged periods of time can cause stomach ulcers and kidney damage. It is important to take them with food and to keep yourself well hydrated. If you are taking them regularly for more than a few weeks, you should have blood work check to monitor your kidney function.

Ice can also be used in the first several days to reduce pain and swelling. It should be used in 20-minute intervals. Ice should never be applied directly to the skin or you could risk developing

frostbite. After the first week or so, heat can also be used to relax the muscles and improve blood flow to the shoulder. This is a good way to “warm-up” the shoulder before exercises.

Pain medications also unfortunately have adverse effects such as addictive potential. Thus it is critical that patients make every effort to reduce their use on a gradual basis during the first few weeks after surgery. Often patients may suffice with Tylenol during the daytime and pain medication only before bed. Patients who require routine use of narcotic pain medication beyond 6-8 weeks after surgery will be recommended to a Pain Management Practice.

Pain medications can also be constipating and cause nausea. If you have a sensitive stomach, you may require an additional prescription to suppress nausea when you take these medications. Be sure to alert the care team if this is the case during your hospital stay so that appropriate prescriptions can be written for you prior to discharge. It is also critical to prevent constipation before it happens. While on narcotic pain medications, you should eat foods rich in fiber and taken an additional stool softener. These can be bought over the counter at pharmacies. If you have not had a bowel movement for a few days after return home, alert the visiting nurse or our office so that we can recommend further steps.

### *Sling*

While at home, you may remove the sling as comfort permits being careful not to overuse the arm. When sitting, you may put the arm in a comfortable position as long as it is supported. If you are in a public area or around other people, be sure to wear the sling to alert others to steer clear of your operated arm. You should also wear the sling at night to protect the arm during sleep for the first 6 weeks.

### *Restrictions*

Until cleared by your surgeon, you should not do the following:

- Lift more than 1-2 pounds (a cup of coffee weights about a pound)
- Swim or submerge your incision underwater
- Use your operated arm for any sporting activity, chores and maintenance type work
- Use your arm for tasks such as opening or closing doors, or other activities that involve pushing or pulling

There are a host of others that could be added to this list. It is best to take a conservative and common sense approach to using the arm in the first 6-8 weeks when tissues healing is a priority. If you have any questions about specific restrictions please call our office before taking any risks that might damage your shoulder.

### *Follow-up*

You will be seen back at the office 6-8 days after surgery to remove the dressing, check the incision and the status of your exercises. You will likely transition to outpatient physical therapy following this visit. Subsequent follow-up visits are then usually scheduled at 6 weeks, 3 months, and 1 year after surgery. After that periodic x-ray checks are suggested at 5 years, 8 years, 10 years and then every 2 years after that. This ensures that if any abnormal wear or other problems occur with the prosthesis, it can be detected early and followed closely to avoid complications.



## Recovery and Rehabilitation

Early motion after shoulder replacement surgery helps achieve the best possible shoulder function. Arthritic shoulders are stiff. 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. However, after surgery, scar tissue will tend to recur and limit movement unless motion is started immediately. Early motion also stimulates recovery of muscle function.

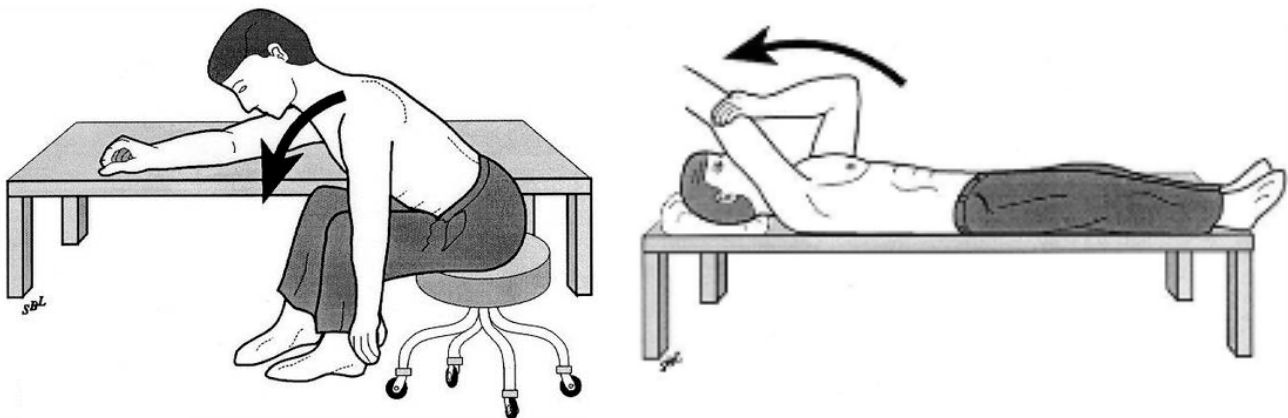
Patients are allowed to remove the sling as soon as the nerve block wears off and can use the arm for eating, dressing and hygiene on the day following surgery. Lifting should be kept to 1-2 pounds only for the first 6 weeks to prevent excessive stress on the repair. Depending on a patient's progress with recovery, resumption of more strenuous activities can commence around 6-8 weeks. Full, unrestricted activity is allowed at 12 weeks but patients will continue to improve in strength and function for up to a year.

### *Home exercises*

Plan on exercising your shoulder 4-5 times daily as instructed by the therapists during your hospital stay. It may be best to time sessions shortly after taking pain medications, so you have the benefit of pain control during the exercise session. The aim is to gradually progress the range of motion to the limits instructed by the therapists. It is okay to stretch to the point of some discomfort, but outright pain should be avoided. Use of ice after a stretching session may help reduce pain and swelling.

The following exercises are critical to achieving early and progressive range of motion.

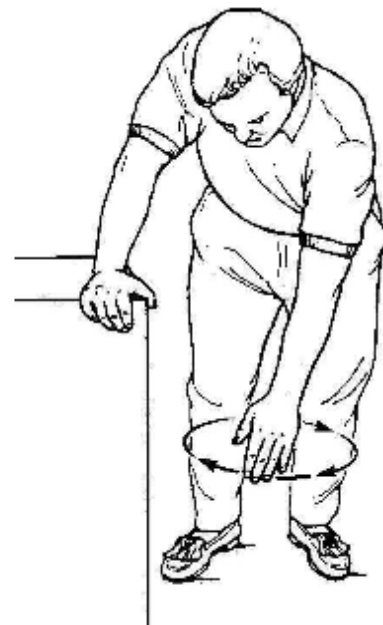
1. **Assisted forward elevation:** this is raising the arm in front of the body. This exercise can be done by sliding the arm across a tabletop using one's body weight to apply pressure to the shoulder. Alternatively, the contralateral arm can be used to assist in elevating the arm while lying flat on your back. The goal is to achieve 140 degrees of elevation, which is about half way between the horizontal and vertical plane.



2. **Assisted external rotation:** this is best done by using a stick or can to rotate the operated arm away from the midline of the body. The elbow should be kept tucked into the side during this maneuver. It may be best to do this lying on your back as well. This will help stabilize the shoulder blade so you do not cheat by extending the shoulder. As your range of motion progresses, you can stabilize your hand on a doorframe and rotate your body away from your hand. This should be done with gentle progressive force being sure not to rotate beyond 45 degrees or about half way between the positions of pointing to the front and pointing to the side.



3. **Pendulum exercises:** lean over and let your arm hang perpendicular to the ground. Use a gentle rhythm to swing your arm in circles clockwise and counterclockwise. Start with small circles and widen as your shoulder warms up. You can also swing it back in forth in a line.



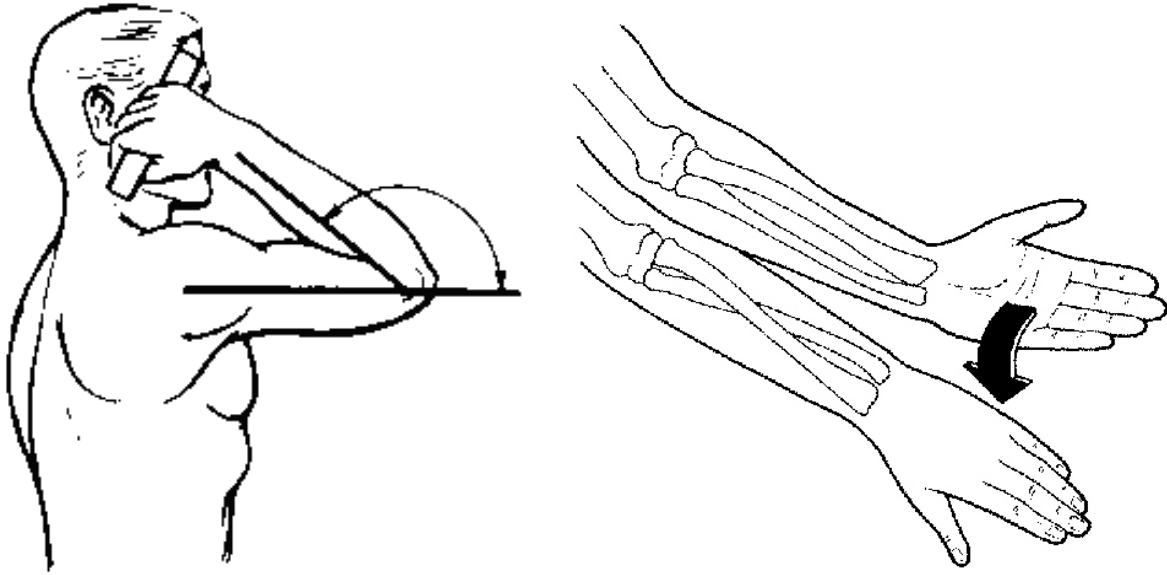
4. **Scapular Pinches:** with you arms at your sides or in the sling, pinch your shoulder blades together



5. **Neck Stretching:** bend your neck and try to touch your ear to each shoulder. This will help stretch your trapezius muscle. Then rotate your neck and try to touch your chin to each shoulder.



6. **Elbow Flexion and Extension:** if your arm remains in the sling for too long your elbow will get stiff and your hand may swell. Be sure to remove the sling several times daily and perform flexion and extension of the elbow. You can also rotate the forearm (pronation and supination).



#### *Outpatient physical therapy*

Recovery of mobility, strength and function is a graduated process that follows tissue healing. We have developed comprehensive therapy protocols that are designed to limit the recurrence of stiffness and re-educate the muscles about the shoulder girdle to function in a smooth and coordinated fashion. These protocols are designed in such a way for the therapist to educate the patients about home exercises throughout the recovery process. The exercises that a patient does on his/her own between therapy sessions are equally as important as the sessions themselves, and patient adherence to this program is critical to preventing early stiffness. A properly performed home exercise program ensures that the exercises are done frequently, effectively and comfortably.

The early recovery period focuses on maintaining the range of motion achieved by release of scar tissue during the surgery. Strengthening of certain muscles may commence to a limited degree immediately following surgery. Formal muscle strengthening with weights starts around 6 weeks and increases in intensity as patients continue to heal. Muscle re-education begins with light resistance exercises for the deltoid and the muscles that stabilize the shoulder blade.

By 3 months patients, may resume full use of the extremity provided they have achieved a functional active range of motion. Progressive strengthening exercises with increased resistance and endurance exercises like swimming, rowing, and upper body ergometer are encouraged. In addition, we strongly encourage an aerobic conditioning program for the lower extremities to promote general health and fitness.

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

#### *Maintenance 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. In addition, a maintenance program to keep the deltoid muscle strong and healthy will ensure proper function of the artificial joint and may help prolong its benefit.

#### *Return to functional and recreational activities*

With the consent of their surgeon, patients can often return to leisure time activities at 3-4 months after their surgery. It is critical that patients achieve sufficient range of motion and strength in advance to prevent muscle fatigue and to undue stress on the artificial components. There are different risks associated with certain types of leisure and sports activities some of which may cause premature wear or damage to the implant.

Three major categories of activities should be avoided. These include

- activities causing high impact stress (chopping wood, hammering, batting, heavy weight lifting)
- activities with potentially high risk of injury (martial arts)
- activities that may result in falling or contact (football, soccer, lacrosse)

Weightlifting is permitted using discretion to avoid heavy loads. Lower weight, higher repetition exercises are okay. Lower stress activities such as walking, hiking, biking, and swimming are encouraged. Golf in moderation is allowed. Tennis play does risk premature wear to the prosthesis.

#### *Return to driving*

One may return to driving around 4-6 weeks after surgery. Most of the steering should be done with unoperated arm using the operated arm only to stabilize the steering wheel at the 6 o'clock position. You must be off narcotic pain medications to drive. Seat belt buckling the door closing should be done with the unoperated arm. Patients must realize that driving with a restricted arm is somewhat risky as any accident, even minor, could damage the tendon repair. Ideally, you should feel comfortable both mentally and physically before you get behind the wheel. It is sometimes beneficial to start driving at off-peak hours on roads with less traffic and less terrain to ease back into the process and ensure safety.

#### *Return to work*

Return to work depends on individual work demands. Sedentary work such as writing and keyboarding can be done as soon as one is comfortable as long as the workstation is ergonomically arranged to avoid having to lift the arm excessively to reach the mouse or keyboard. Ideally, the arms should be able to rest comfortably at the side with the elbows or forearms supported on a rest. Physical work that requires reaching, lifting, pushing, pulling etc.... requires recovery of motion and strength. This may take 3-4 months. In general, it is a good idea to transition back to work gradually.

You may choose to work part time for a few weeks. Always commit time to do your exercises during throughout the day, particularly stretching exercises so that your shoulder does not get stiff if kept in one position for periods of time.

*How long will the shoulder replacement last?*

A properly performed shoulder replacement generally lasts between 10-20 years. Factors that determine the longevity of the prosthesis include age, hand dominance, physical demands, compliance with limitations among others. The duration of comfort and function afforded by a shoulder replacement cannot be predicted in advance in any given case. Revision surgery for a failed reverse shoulder replacement is very technically demanding and may not be possible in all cases. Conversion to a partial shoulder replacement with a large ball on the humeral prosthesis may provide some stability and function but outcomes are generally inferior to the original reverse shoulder. In general, however, the results of revision shoulder replacement are not as good as for primary shoulder replacement.