MASSACHUSETTS GENERAL HOSPITAL
ORTHOPAEDICS

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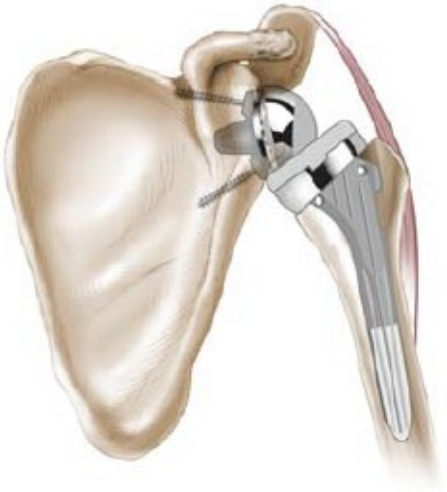
Reverse Total Shoulder Arthroplasty (rTSA)

The shoulder is a ball and socket joint that enables you to raise, twist, bend and move your arms forward, to the sides and behind you. The head of the upper arm bone (humerus) is the ball and a circular depression (glenoid) in the shoulder bone (scapula) is the socket. A soft tissue rim (labrum) surrounds and deepens the socket. The head of the upper arm bone is coated with a smooth, durable, covering (articular cartilage) and the joint has a thin, inner lining (synovium) for smooth movement. The surrounding muscles and tendons provide stability and support.

In an arthritic shoulder the normal cartilage 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 bony growth (osteophytes) which is the body's attempt to "heal" the cartilage injury. Pain is usually due to the irregular joint surfaces rubbing on one another and from the inflammation of this wear and tear.

Many people know someone with an artificial knee or hip joint. Less common, but just as successful in relieving joint pain is a shoulder replacement (also called shoulder arthroplasty). Conventional shoulder replacement surgery replaces damaged joint surfaces with artificial parts (prostheses). Usually there are two components: The humeral component replaces the head of the upper arm bone, while the glenoid component replaces the socket (the glenoid depression).

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. 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 shoulder 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.



The Inverse 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 is replaced with an implant that has a socket into which the artificial ball rests. 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). 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 by moving the center of rotation of the joint inward (medially) and downward (inferiorly). The result is the patient can raise his or her arm higher and sometimes even overhead.

This shoulder implant has been used in Europe for nearly 15 years. While the experience there has been very successful, 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.

The complication rate, however, is about 20%. 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
- Hematoma or blood clots

Postop Instructions

You will wake up in the operating room with a sling in place. You will go to the recovery room and then to a hospital room after a few hours. You can get out of bed when you wish. You should continue to apply ice to your shoulder to reduce pain and swelling.

Pain is usually controlled for the first 18-24 hours with a nerve block, which will be explained further by your anesthesiologist prior to surgery. Should you elect not to have a nerve block pain will be controlled via intravenous narcotic medications through a patient controlled anesthesia (PCA) machine. This machine delivers the pain medication to you when you push a button. Afterwards you will be transitioned to an oral pain medications such as oxycodone.

While a blood transfusion is rare, it is occasionally necessary. You may discuss donating your own blood in advance so it can be given to you should you require a transfusion after surgery.

You may be discharged home on either the first or second postoperative day. You will need someone to assist you 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 instances it is necessary to go to a supervised rehabilitation facility for a period of time until you can begin effectively using your arm.

Activites & Advice for in the Hospital and while at Home

1. Please call with any concerns: 617-726-6648.
2. Apply ice to the shoulder as it will be quite helpful. After two days, you can change the dressing to a smaller one to allow the cold to better get to the shoulder. Be sure to leave the little pieces of tape (steri-strips) in place.
3. Remove the sling on the first day after surgery. Move your elbow, wrist, hand and finger several times a day. Begin the pendulum exercises several times a day. Put the sling back on when you're done with these exercises.
4. After two days it is okay to shower but do not get the wound wet for at least two weeks after surgery. Do not submerge the wound as you would in a bath tub or hot tub for at least 4 weeks after surgery. To wash under your operated arm bend over at the waist and let the arm passively swing away from the body. It is safe to wash under the arm in this position.
5. After shoulder surgery there is a variable amount of pain and swelling. This will dissipate after several days. Continue to take the pain medicine you were prescribed as needed. Remember it is called pain control, not pain elimination.
6. It is important to look out of signs of infection following joint replacement surgery. These can include: fever (temperature > 101.5°, chills, nausea, vomiting, diarrhea, redness around your incision, or yellow or green drainage from your incision. Should any of these be present please contact Dr. Price's office immediately.
7. You will need to take prophylactic antibiotics before dental procedures, colonoscopies or other invasive procedures. This consists of Amoxicilin (2 grams one hour prior to your procedure), or if you have a penicillin allergy you should take Clindamycin (600mg one hour prior to procedure). Your dentist or Dr. Price can prescribe this.
8. You will have an office visit scheduled approximately 10-14 days after your surgery.

Precautions: There is a higher risk of shoulder dislocation following a reverse total shoulder arthroplasty (rTSA) than with conventional shoulder replacement. Stability and mobility of the shoulder joint is now dependent upon the deltoid and periscapular musculature. Patients with rTSA don't dislocate with the arm in abduction and external rotation. Rather, they tend to dislocate with the arm in internal rotation and adduction in conjunction with extension. Thus, tucking in one's shirt or performing bathroom hygiene with the operative arm is particularly dangerous. These will remain in effect for at least 12 weeks postoperatively.

- No shoulder extension past neutral
- No combined adduction and internal rotation and extension

The start of this protocol will often be delayed 3-4 weeks following rTSA for a revision.

Phase I: Immediate Postoperative Phase (0-7 days after surgery)

Goals:

1. Protect the shoulder arthroplasty
2. Ensure wound healing
3. Prevent shoulder stiffness
4. Restore active ROM of the elbow, wrist and hand
5. Maximize ADL's with modifications/precautions in mind

Activities:

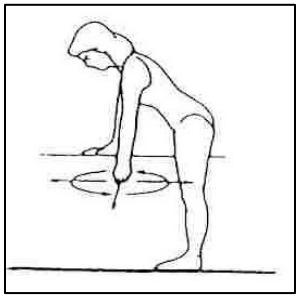
1. Use your sling during this period. Keep the sling on when sleeping at night for the first 4 weeks.
2. Begin the phase one exercises. Supine exercises should be done with a small rolled towel placed behind the elbow to avoid shoulder hyperextension and anterior capsular stretch. Keep your elbow in front of you – you should always be able to see your elbow when doing exercises.
3. No active motion of the shoulder. No lifting of objects with the operated side.
4. Continue to use your ice: 7 days per week, 4-5 times per day, 15-20 minutes per time

Exercises:

ALL EXERCISES SHOULD BE DONE SLOWLY TO MAXIMIZE MUSCLE AND SOFT TISSUE INVOLVEMENT. DISCOMFORT IS ALLOWED – PAIN IS NOT. IF THE PAIN LINGERS AFTER THE STRETCH, THAT IS TOO FAR.

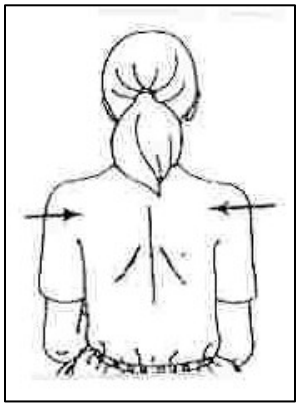
The following exercises will be demonstrated for you by your therapist while you're at Mass General. Once you are discharged from the hospital, continue doing these at home as shown.

Program: 7 days per week, 4-5 times per day		
Pendulum exercises	1-2 sets	20-30 reps
Supine external rotation	1-2 sets	10-15 reps
Supine forward arm elevation	1-2 sets	5-10 reps
Shoulder blade pinches	1-2 sets	5-10 reps

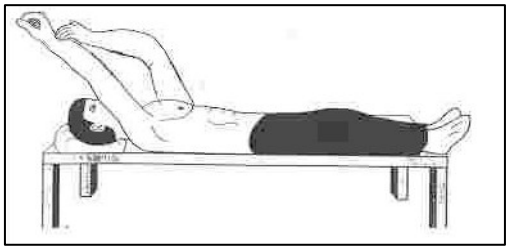


Pendulum exercises
Remove your sling, bend over at the waist and let the arm hang down. Using your body to initiate movement, swing the arm gently forward and backward and in a circular motion.

Supine external rotation
Lie on your back. Keep the elbow of the operated arm against your side with the elbow bent 90 degrees. Using a cane or a long stick in the opposite hand, push against the hand of the operated arm so that the operated arm rotates outward. Hold for 10 seconds, relax and repeat. **The amount of allowed external rotation will be specified after surgery.**



Shoulder blade pinches
While standing, pinch shoulder blades backward and together.



Supine forward flexion
Lie on your back. Hold the affected arm at the elbow with the opposite hand. Assisting with the opposite arm, lift the operated arm upward, as if the bring the arm overhead. Slowly lower the arm back to the bed. **The amount of allowed forward flexion will be specified after surgery.**

Phase II: Initiate Outpatient Rehab (1-6 weeks after surgery)

Goals:

1. Protect the shoulder and avoid overstressing the repair
2. Restore full passive range of motion
3. Gradually restore active motion
4. Re-establish dynamic shoulder stability

Activities:

1. Continue using your sling during this period. Keep the sling on when sleeping at night for the first 4 weeks.
2. Continue to follow your shoulder dislocation precautions. No exceptions.
3. The following exercises will be demonstrated to you by your physical therapist. He or she will also give you a home exercise program. You should strive to do your home exercise program at least 3-4 times per day, every day. The success of your new shoulder depends on your rehab.
4. Supine exercises should be done with a small rolled towel placed behind the elbow to avoid shoulder hyperextension and anterior capsular stretch. Keep your elbow in front of you – you should always be able to see your elbow when doing exercises.
5. No active motion of the shoulder. No lifting of objects with the operated side.
6. Continue to use your ice: 7 days per week, 4-5 times per day, 15-20 minutes per time
7. You will see Dr. Price at 2 weeks after surgery and again at 6 weeks after surgery.

Exercises:

Week 1-3:

- Continue all exercises listed above
- Begin sub-maximal pain-free deltoid isometrics in the scapular plane (avoid shoulder extension when isolating posterior deltoid)
- The scapular plane is defined as the shoulder positioned in 30 degrees of abduction and forward flexion with neutral rotation. ROM performed in the scapular plane should enable proper shoulder joint alignment.

Week 3-6:

- Progress above exercises
- Progress PROM:
    - Supine forward flexion and elevation in the scapular plane to 1200.
    - ER in scapular plane to tolerance. Respect soft tissue constraints – this should not hurt, but feel only like an uncomfortable stretch.
- Gentle resisted exercises of elbow, wrist and hand.

Phase III: Active Range of Motion/Early Strengthening (6-12 weeks after surgery)

Criteria for progression to Phase III:

1. Tolerate shoulder PROM and isometrics
2. Tolerate AROM/minimal resistance program for elbow/wrist/hand
3. Demonstration of ability to isometrically activate all components of the deltoid and periscapular musculature in the scapular plane.

Goals:

1. Progression of PROM (note: full PROM is not expected).
2. Gradual restoration of AROM
3. Control pain and inflammation
4. Protect the wound, do not overstress soft tissues
5. Re-establish dynamic shoulder and scapular stability

Activities:

1. The sling is no longer necessary. It is advisable to continue to wear it when out in public or large crowds as this may help people to avoid "slapping" you on the shoulder.
2. You may now use your operated arm. Avoid having your arm forcefully pulled. No supporting body weight with your operative upper extremity.
3. Continue to avoid heavy lifting or manual labor. You should not lift anything heavier than a coffee cup. Any lifting should be done with weight in front of you.
4. You may use your arm for feeding and light activities of daily living including dressing and washing.
5. Ice as needed for pain control. It is still a good idea to ice after therapy.
6. Check with Dr. Price regarding driving.
7. You will see Dr. Price at 3 months after surgery.

Exercises:

In the presence of poor shoulder mechanics avoid repetitive shoulder AROM exercises and activity. Continue to avoid shoulder hyperextension and be mindful of dislocation precautions.

Weeks 6-8:

- Continue with PROM program.
- Start PROM IR to tolerance (not to exceed 50°) in the scapular plane.
- Begin shoulder AA/AROM as appropriate.
    - Forward flexion and elevation in scapular plane in supine with progression to sitting/standing.
    - ER and IR in the scapular plane in supine with progression to sitting/standing.
- Begin gentle glenohumeral IR and ER sub-maximal pain free isometrics.
- Initiate gentle scapulothoracic rhythmic stabilization and alternating isometrics in supine as appropriate. Begin gentle periscapular and deltoid sub-maximal pain free isotonic strengthening exercises, typically toward the end of the 8th week.
- Progress strengthening of elbow, wrist, and hand.
- Gentle glenohumeral and scapulothoracic joint mobilizations as indicated

Weeks 9-12:

- Continue with above exercises and functional activity progression.
- Begin AROM supine forward flexion and elevation in the plane of the scapula with light resistance resistive bands or sport cords at varying degrees of trunk elevation as appropriate. (e.g. supine lawn chair progression with progression to sitting/standing).
- Progress to gentle glenohumeral IR and ER isotonic strengthening exercises in side-lying position with light resistance resistive bands or sport cords.

Phase IV: Strengthening Phase (week 12 onward)

Criteria for progression to phase IV:

1. Improving function of the shoulder.
2. Patient demonstrates the ability to isotonically activate all components of the deltoid an periscapular musculature.
3. Patient is gaining strength.

Goals:

1. Enhance functional use of operative extremity and advance functional activities
2. Enhance shoulder mechanics, muscular strength and endurance

Activities:

1. No heavy lifting (nothing heavier than 5 lbs). Weights should never go behind the head – you should always be able to see them. For therapy exercises Therabands are preferred over weights as these are more easily controlled.
2. No sudden or jerking motion.
3. Ice as needed after therapy.
4. You will see Dr. Price at 6 months and 1 year after surgery.

Exercises:

Week 12-16:

- Continue with the previous program as indicated.
- Progress to gentle resisted flexion, elevation while standing.

Continued Home Program (Typically 4 + months postop):

Typically the patient is on a home exercise program at this stage to be performed 3---4 times per week with the focus on:

1. Continued strength gains
2. Continued progression toward a return to functional and recreational activities within limits as identified by progress made during rehabilitation and outlined by surgeon and physical therapist.

Criteria for discharge from skilled therapy:

1. Patient is able to maintain pain free shoulder AROM demonstrating proper shoulder mechanics. (Typically 80 – 1200of elevation with functional ER of about 30 degrees).
2. Typically able to complete light household and work activities.