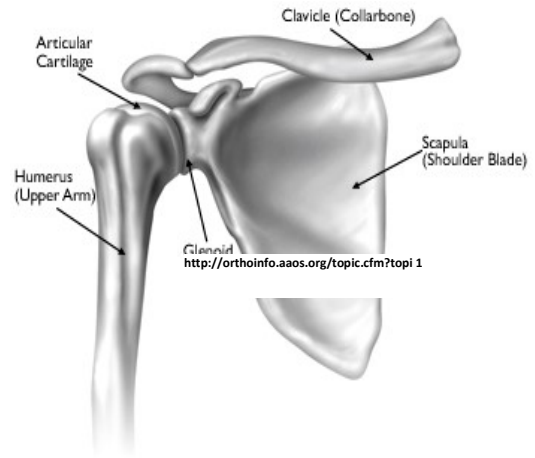


## Total Shoulder Arthroplasty

### Anatomy and Biomechanics

The shoulder is a complex structure that joins the arm to the body. It is comprised of three bones, including the humerus (upper arm bone), scapula (shoulder blade), and clavicle (collarbone). The primary shoulder joint is a ball-and-socket joint where the ball-shaped head of the humerus attaches to a socket on the scapula called the glenoid. The glenoid is smaller than the head of the humerus. This construct allows the shoulder to have a greater range of motion (ROM) than any other joint in the body. Both the head of the humerus and glenoid are lined with smooth cartilage, which allow the bones to glide easily on one another. This cartilage may naturally wear down over time creating a rough surface between the bones. Without smooth healthy cartilage the shoulder also has a hard time producing the natural joint synovial fluid that lubricates the shoulder during movement. Collectively, these degenerative processes that happen over time lead to the condition known as osteoarthritis. This process can happen naturally overtime, but can be more severe or develop quicker in some people, especially after trauma.



<http://www.ourhealthnetwork.com/conditio 1>

As degenerative changes in the shoulder progress the joint becomes more and more painful and less and less mobile. Osteoarthritis typically produces stiffness in the joint, especially right after a period of immobility (i.e. first thing in the morning). The pain in the joint may subside after moving around, but become worse again with use of your arm. The pain in the joint may also affect sleeping. As the condition of the joint deteriorates, some people develop a sensation of grinding or catching in the shoulder with movement. It often becomes harder and

harder to use the affected arm and eventually the shoulder may lose some of its range of motion.

### Treatment Options

Regardless of the nature and severity of the osteoarthritis in your shoulder your physician will work with you to determine what the best course of treatment will be. When degenerative changes are not severe the associated pain and dysfunction may successfully be treated with rest, anti-inflammatory measures, injections, activity modification and physical therapy. After a thorough evaluation, your physician and their staff will recommend the most appropriate course of action to take.

Physical therapy is often recommended for treatment of pain and dysfunction associated with osteoarthritis. The physical therapist will evaluate your mobility, flexibility and strength with the purpose of determining any underlying deficits that contribute to increased stress on the painful joint. You will be counseled on which activities you can safely continue and which should be avoided. The physical therapist will teach you exercises that will help to reduce stress on the shoulder joint and improve mobility. In most cases this will include strengthening and stretching the muscles around the entire shoulder complex and upper back.

When joint degeneration is severe and conservative measures are unsuccessful in restoring function, your physician may recommend a total shoulder replacement procedure.

## **Surgery**

Total Shoulder Arthroplasty (Replacement) is a complex procedure that involves the removal and replacement of both the ball and the socket of the shoulder. First, an incision is made, most commonly along the front of the arm, and the joint is exposed. The head of the humerus (ball) is removed and the glenoid (socket) is smoothed. A polyethylene plastic insert is placed in the glenoid and secured with cement to form the new socket. Next the humeral stem is fit into position. Depending on the fit of the stem and your surgeon's preference, cement may or may not be used to secure the stem. Lastly, a carefully fit metal ball is secured to the end of the humeral stem and the shoulder is rejoined.

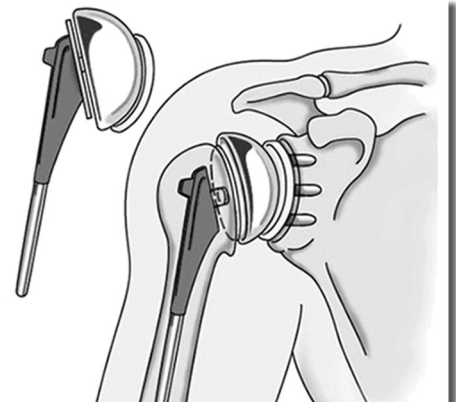


Figure 2. Shoulder joint replacement.

Total Shoulder Arthroplasty is not currently outpatient day surgery procedure. If the procedure and your early recovery goes well you will typically be discharged in 1-2 days. Some more complex cases require a short stay in a rehab hospital following the procedure.

## **Post-Operative Precautions**

The new prosthetic joint is not as stable as a natural shoulder joint, and it needs to be protected while the surrounding soft tissue structures heal after surgery. You must wear a sling after your operation to allow for this healing to occur. This may be as long as 4-6 weeks. In addition, there are specific movement and weight bearing precautions you must follow after surgery:

- While lying on your back, a small pillow or towel roll should be placed behind your elbow to avoid stretching the repaired tendons and ligaments, *i.e. you should always be able to see your elbow in front of your body when lying on your back.*
- Do NOT place your operative arm behind your back or behind your head.
- Limited active movement and reaching with the operative arm until your doctor or therapist allows you
- Avoid tucking in a shirt or performing bathroom hygiene with the operative arm.

You must observe these precautions for at least 6 weeks after your operation unless otherwise instructed by your surgeon.

## **At Home**

You may receive home visits from a registered nurse and an occupational therapist after being discharged home. The nurse will help monitor your medical status and the occupational therapist will help you work to restore mobility and tolerance for activity. If you have staples closing your incision, they will likely be scheduled to be removed around 10-14 days after the operation. The occupational therapist will work with your surgeon and their staff to determine when you are ready to attend outpatient physical therapy (generally 2 weeks after surgery).

## **Surgical Incision/Dressing**

You will have a dressing placed on your arm after surgery which will remain in place for 1 week. If you have staples closing your incision they will likely be scheduled to be removed, and replaced with steri-strips, around 10-14 days after the operation. Allow the steri-strips to fall off on their own or to be removed at your next doctor's office visit. If your surgeon used glue to close the wound do not remove it and it will gradually fall off approximately 1 month after surgery.

### **Showering**

You may shower with the post-op dressing immediately. After the dressing is removed you may shower as long as the incision is not draining. If the incision is draining try to keep it from getting wet during showering by using a water-tight dressing. It is best to use a shower bench if possible for safety.

### **Medication**

Your surgeon will prescribe pain medicine for you after the operation. Please call the doctor's office if you have any questions regarding medication.

### **Driving**

Your surgeon will tell you when you are ready to return to driving. Commonly, you are not permitted to drive until your sling is off, which may take 4-6 weeks. You cannot drive while taking narcotics.

### **Ice**

You must use ice on your shoulder after the operation for management of pain and swelling. Ice should be used consistently throughout the day while in the hospital. Once home, you may taper down to applying ice 3-5 times a day for 10 to no more than 20 minutes at a time. Typically, the best time for this is after exercise. Always maintain one layer between ice and the skin. Putting a pillowcase over your ice pack works well for this. The home care occupational therapist can help you customize a plan on how and when to apply ice to your shoulder.



### **Post-Operative Office Visits**

Your first post-operative visit will be 10-14 days after the operation. At this visit you will meet with the surgeon or the physician assistant who will look at your shoulder range of motion, examine your incision, review x-rays, and discuss when it will be appropriate to make an appointment to begin outpatient physical therapy. Your next visit will be around 6 weeks after the operation. Additional follow up visits to the doctor's office will be based on your surgeon's discretion.

### **Weight Bearing**

After surgery, you will not be allowed to put weight through the operated arm. Your surgeon and physical therapist will help guide you as to when it is appropriate to start bearing weight on the operative arm.

### **Recovery/Time off Work**

Recovering from Total Shoulder Arthroplasty surgery is not easy. It is very important to realize that the recovery process is difficult and time consuming. You must be an active participant during this process, performing daily exercises to ensure there is proper return of range of motion and strength. There is a large amount of variability in the time it takes to fully recover from this procedure. It is usually estimated that it will take at least 6 months for you to feel as though you have completely returned to a pre-injury level of activity. The shoulder will likely continue to improve for 12 months after surgery. People with desk jobs should plan to take at least 4 weeks off



from work and should have an extended absence plan in place should complications arise. People with more physical jobs that require excessive weight bearing and manual labor will likely be out of work for at least 3-6 months. **Recovery is different in each case.** Your surgeon will discuss your individual timetable for return to activities and work during post-operative office visits.

## Rehabilitation

**\*\*The following is an outlined progression for rehab. Time tables are approximate and advancement from phase to phase, as well as specific exercises performed, should be based on each individual patient's case and sound clinical judgment by the rehab professional. \*\***

\*The scapular plane is defined by the shoulder being positioned in 30 degrees of both horizontal abduction and forward flexion with neutral rotation. This ensures appropriate joint alignment.

### Phase 1: Generally Day 0 to 4 Weeks Post-Op

#### Goals

- Protect and allow healing of soft tissue
- Control pain and swelling
- Begin to restore range of motion (ROM) within guidelines
- Independence with activities of daily living (ADLs), ie. Dressing, toileting etc.
- Independence with home exercise program
- Educate the patient regarding their post-operative precautions

#### Precautions

- Post-operative precautions (see page 2)
- AROM limited to hand, wrist and elbow and some limited forward reaching in front of the body
- NO lifting greater than a coffee cup or weight-bearing with operated arm
- May use the extremity to eat, hold a book, keyboard when comfortable
- NO reaching behind the back or behind the head
- Sling
  - May begin to wean sling at 4 weeks or per MD recommendation
    - As comfort improves encourage out of sling in sitting
    - Sling on when ambulatory
    - Strict use of sling in public or when active at home
  - Recommended to continue to sleep in the sling for 6 weeks

#### Inpatient Plan of Care

- Screen for sensory/motor deficits
- Continuous Cryotherapy
- Provide patient education for movement precautions and positioning to avoid shoulder extension past 0\* (to prevent subscapularis stretch)
- Initiate home exercise program
- Discharge planning

#### Recommended Exercises

##### Range of Motion

- Pendulums
  - Small Diameter
- AROM

- Hand, Wrist, Forearm, and Elbow
- PROM
  - Flexion: 0 to 140 as tolerated
  - IR: to body
  - ER
    - Limit to 0 degrees weeks 0-2
    - Limit to 20 degrees weeks 2-4

#### Strength

- Scapular Range of Motion and isometric holds (elevation/depression, retraction/protraction)

#### Functional Mobility

- Bed mobility – Do not push off with operated extremity
- Transfer training

#### Positioning (when in bed)

- While supine, always place a small pillow or towel roll behind the operated arm's elbow to avoid shoulder hyperextension, stretching the anterior capsule, or stretching the subscapularis.

#### **Guidelines**

- Perform PROM exercises 2-3x/day. Perform 10-15 repetitions of all elbow/wrist/hand exercises and scapular range of motion 3-5 times a day. Use ice after PROM for 10-20 minutes.

## **Phase 2: Generally 4 to 6 Weeks Post-Op**

#### **Goals**

- Continue to restore PROM
- Begin restoring AAROM
- Control pain and swelling
- Continue to protect healing tissue

#### **Precautions**

- Post-operative precautions
- NO lifting greater than 1 pound with operative arm
- NO active overhead lifting
- NO reaching behind the back or behind the head
- NO sudden jerking movements of operative shoulder

#### **Recommended Exercises**

##### Range of Motion

- PROM
  - Flexion: Progress as tolerated (no forced motion)
  - IR: Progressive IR in Scapular Plane (no forced motion)
  - ER
    - Limit to 30 degrees weeks 4-6
- AAROM

- Initiate active assisted flexion, IR, ER
- No forced end range
- No extension/IR behind back

#### Joint Mobilizations

- Gentle glenohumeral and scapulothoracic joint mobilization as indicated

#### Strengthening

- Initiate sub-maximal shoulder isometrics in neutral position
  - **No isometric IR**
- Initiate Peri-scapular strengthening exercises as tolerated
- May initiate gentle glenohumeral and scapulothoracic rhythmic stabilization

#### **Guidelines**

Perform 10-20 repetitions of all ROM exercises 2x/day. Perform 10-20 repetitions of isometric shoulder exercises 1x/day, and 2-3 sets of 10-15 repetitions of periscapular strengthening exercises 1x/day.

### **Phase 3: Generally 6-12 Weeks Post-Op**

#### **Goals**

- Restore functional AROM
- Begin to restore functional strength
- Optimize neuromuscular control in the shoulder complex
- Return to baseline functional activities

#### **Precautions**

- Continue to avoid stress on the anterior capsule
- If poor shoulder mechanics are present, avoid repetitive shoulder AROM
- NO heavy lifting (>5 pounds), pushing, or pulling
- NO sudden jerking movements of the operative shoulder

#### **Recommended Exercises**

##### Range of Motion and Stretching

- PROM
  - Flexion and IR: Continue to progress as tolerated
  - ER: Slowly progress ER in plane of scapula
    - Goal to achieve functional ER range of motion by 12 wks post op
    - No forced ER stretching
- AAROM
  - Continue progressive active assisted exercises as indicated
  - May initiate assisted IR behind back
- AROM
  - Initiate AROM exercises
  - Focus on proper shoulder kinematics

##### Joint Mobilizations

- Continue Glenohumeral and scapulothoracic joint mobilizations as indicated

##### Strengthening

**\*Delay resisted strengthening until phase 4 if concomitant rotator cuff repair (supra, infra,**



teres)

- Continue peri-scapular strengthening progression
- Continue gentle rhythmic stabilization
- Initiate supine shoulder elevation strengthening at progressive inclines
- May Initiate rotator cuff strengthening at 10 wks or per MD recommendation
  - Delay IR resistance until 12 wks

### **Guidelines**

Perform 10-20 repetitions of all ROM exercises daily. Hold all stretches 20-30 seconds for 2-3 repetitions, 2-3x/day. Perform 2-3 sets of 15-20 repetitions of all strengthening exercises 4-6x/week.

## **Phase 4: Generally 12 Weeks Post-Op and Beyond**

### **Goals**

- Maintain pain-free ROM
- Maximize return of strength, power, and endurance
- Maximize UE function
- Progress weight-bearing tolerance
- Work with PT and MD to create customized exercise plan to allow return to appropriate sports/ recreational activities

### **Precautions**

- Continue to avoid stressing the anterior capsule
- Ensure gradual progression of strengthening program

### **Recommended Exercises**

#### ROM and Flexibility

- Continue AROM stretching exercises as indicated

#### Strengthening

- Continue with all strengthening exercises with increasing resistance
- Initiate and progress weight-bearing exercises

#### Functional Progression

- Activity/sport-specific training exercises

### **Guidelines**

Perform ROM and flexibility exercises daily.

Perform strengthening exercises 3-5x/ week, performing 2-3 sets of 10-15 repetitions.



<b>Time</b>	<b>Precautions</b>	<b>Goals</b>	<b>Recommended Exercises</b>
<b>Phase 1:</b> Day 1 – 4 Weeks	<ul style="list-style-type: none"> <li>• Dislocation precautions</li> <li>• Limited FF AROM</li> <li>• NO lifting or weight bearing with operative arm</li> <li>• PROM:FF to 140, IR to body, ER in scapular plane to 0 (0-2 wks) and 20 (2-4 wks)</li> <li>• Wean Sling at 4 Wks or per MD Recommendation</li> </ul>	<ul style="list-style-type: none"> <li>• Protect and allow healing of soft tissue</li> <li>• Control pain and swelling</li> <li>• Begin to restore PROM</li> <li>• Restore independent functional mobility</li> <li>• Educate the patient regarding their dislocation precautions</li> </ul>	<p><u>ROM</u></p> <ul style="list-style-type: none"> <li>• Supine PROM: forward flexion, gentle ER/IR in scapular plane Limit ER per precautions</li> <li>• AROM: elbow, wrist, and hand</li> <li>• Pendulum exercises</li> </ul> <p><u>STRENGTH</u></p> <ul style="list-style-type: none"> <li>• Peri-scapular muscle active motion and isometrics</li> </ul> <p><u>FUNCTIONAL MOBILITY</u></p> <ul style="list-style-type: none"> <li>• Bed mobility</li> <li>• Transfer training</li> </ul> <p><u>POSITIONING (when in bed)</u></p> <ul style="list-style-type: none"> <li>• While supine, always place a small pillow or towel roll behind the operated arm's elbow</li> </ul>
<b>Phase 2:</b> 4 Weeks – 6 Weeks	<ul style="list-style-type: none"> <li>• Dislocation precautions</li> <li>• NO lifting &gt; 1 lb. or weight bearing with operative arm</li> <li>• No sudden jerking movement of operative shoulder</li> <li>• PROM: Flexion and IR in scapular plane as tolerated. Limit ER to 30 degrees</li> </ul>	<ul style="list-style-type: none"> <li>• Restore functional PROM</li> <li>• Begin to restore AAROM</li> <li>• Continue to Control pain and swelling</li> <li>• Continue to protect healing tissue</li> </ul>	<p><u>ROM</u></p> <ul style="list-style-type: none"> <li>• Continue with PROM exercises in scapular plane. Progress Flexion and IR as tolerated. Limit ER to 30 (no forced Passive ER)</li> </ul> <p><u>Joint Mobilizations</u></p> <ul style="list-style-type: none"> <li>• Gentle glenohumeral and scapulothoracic joint mobilizations</li> </ul> <p><u>Strengthening</u></p> <ul style="list-style-type: none"> <li>• Initiate sub-maximal shoulder isometrics in neutral (No IR)</li> <li>• Periscapular strengthening exercises as tolerated</li> <li>• Initiate glenohumeral and scapulothoracic rhythmic stabilization</li> </ul>
<b>Phase 3:</b> 6 Weeks – 12 Weeks	<ul style="list-style-type: none"> <li>• Continue to avoid stress on the anterior capsule</li> <li>• NO heavy lifting (&gt;5 pounds), pushing, or pulling</li> <li>• NO sudden jerking movements in operated shoulder</li> <li>• If poor shoulder mechanics are present, avoid repetitive shoulder AROM</li> </ul>	<ul style="list-style-type: none"> <li>• Restore normal shoulder AROM</li> <li>• Optimize neuromuscular control in the shoulder complex</li> <li>• Return to baseline UE functional activities</li> </ul>	<p><u>ROM</u></p> <ul style="list-style-type: none"> <li>• Continue PROM as needed, progressing to gentle stretching</li> <li>• Initiate shoulder AAROM IR behind back</li> <li>• Initiate Shoulder AROM: shoulder flexion, scaption, ER, and IR</li> </ul> <p><u>Joint Mobilizations</u></p> <ul style="list-style-type: none"> <li>• Glenohumeral and scapulothoracic joint mobilizations as indicated</li> </ul> <p><u>Strengthening</u></p> <ul style="list-style-type: none"> <li>• Initiate supine shoulder elevation strengthening at progressive inclines</li> <li>• Continue periscapular strengthening progression</li> <li>• Resisted rotator cuff strength at 10 wks (delay IR until 12 wks)</li> <li>• Progress to resisted flexion, abduction, and extension towards the end of this phase</li> </ul>
<b>Phase 4:</b> 12 weeks and Beyond	<ul style="list-style-type: none"> <li>• Continue to avoid stressing the anterior capsule</li> <li>• Ensure gradual progression of</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain pain-free ROM</li> <li>• Maximize strength, power, and endurance</li> </ul>	<p><u>ROM</u></p> <ul style="list-style-type: none"> <li>• Continue daily PROM and stretching exercises as indicated</li> </ul> <p><u>Strengthening</u></p>

	<p>strengthening program</p>	<ul style="list-style-type: none"> <li>• Maximize UE function</li> <li>• Progress weight bearing tolerance</li> <li>• Work with PT and MD to create customized exercise plan to allow return to appropriate sports/recreational activities</li> </ul>	<ul style="list-style-type: none"> <li>• Continue with all strengthening exercises increasing resistance and decreasing repetitions</li> <li>• Initiate and gradually progress weight bearing exercises</li> </ul> <p><u>Functional Progressions</u></p> <ul style="list-style-type: none"> <li>• Activity/sport-specific training exercises</li> </ul>
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