

Rehabilitation Guidelines for Shoulder Arthroplasty and Reverse Ball and Socket Arthroplasty

The anatomic configuration of the shoulder joint (glenohumeral joint) is often compared to that of a golf ball on a tee. This is because the articular surface of the round humeral head is approximately four times greater than that of the relatively flat shoulder blade face (glenoid fossa). This configuration provides less boney stability than a truer ball and socket joint, like the hip. The stability and movement of the shoulder is controlled primarily by the rotator cuff muscles, with assistance from the ligaments, glenoid labrum and capsule of the shoulder. The rotator cuff is a group of four muscles: subscapularis, supraspinatus, infraspinatus and teres minor (Figure 1).

The articular surface of the humerus (upper arm bone) and glenoid fossa (shoulder blade) is normally covered with a layer of hyaline cartilage called articular cartilage. The articular cartilage has a frictional coefficient approximately 1/5 of ice on ice – i.e. rubbing articular cartilage on articular cartilage would be five times smoother than rubbing ice on ice. This allows for a very smooth gliding surface. A large portion of articular cartilage is fluid, which also provides significant resistance to compressive forces.¹

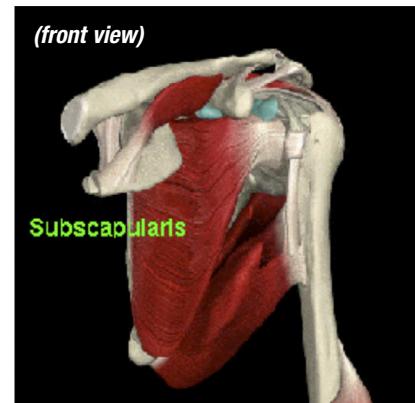
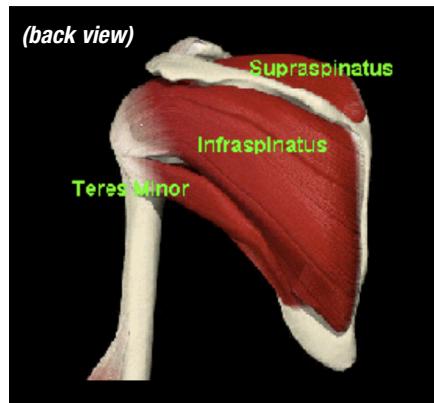


Figure 1 Rotator cuff anatomy

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Degenerative joint disease or arthritis causes a slow progressive breakdown of this cartilage to occur. This often results from very large, long standing rotator cuff tears, in which case you have lost the ability to stabilize your shoulder and more shear stress is imparted to the articular cartilage. This is referred to as rotator cuff tear arthropathy.

Arthritis can also result from repeated stress and loads to the shoulder and previous dislocations. Regardless of the cause, when this happens you lose the normal smooth gliding articulation and the ability to resist compressive forces at the joint. These changes can cause pain, swelling, loss of motion, weakness and reduced function or performance.

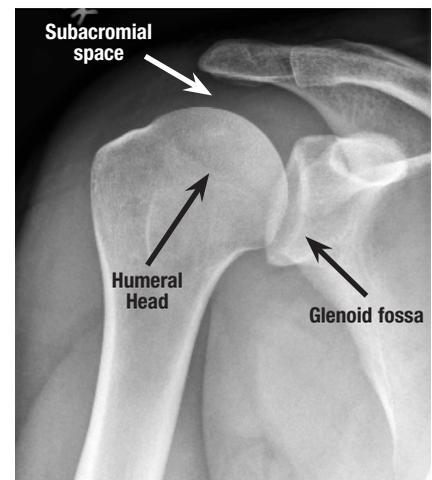


Figure 2 Normal shoulder radiograph

Surgical repair of widespread articular cartilage injury and breakdown is not yet a viable option because of

Shoulder Arthroplasty and Reverse Ball and Socket Arthroplasty

limitations in articular cartilage healing and fixation. What is a potential option is replacing the articular cartilage surface with a prosthetic component that replicates the properties of the articular cartilage. “Shoulder Arthroplasty” and “Reverse Ball and Socket Arthroplasty” are two surgical options for replacing the articular surfaces of the humeral head and glenoid. In shoulder arthroplasty the humeral head (ball) is replaced with metal and the glenoid (tee) is replaced with a plastic liner. In the reverse ball and socket arthroplasty the joint is actually flipped upside down such that the ball is now attached to the shoulder blade and the tee is attached to the top of the arm. This procedure is used when the

rotator cuff function is permanently and severely limited. By reversing the joint the deltoid can have a greater impact on improving active shoulder range of motion and function.

Rehabilitation is vital to regaining motion, strength and function of the shoulder after surgery. In these procedures the subscapularis is detached for exposure of the glenohumeral joint and then reattached after the repair is complete. This reattachment must be protected for 6 weeks. During this time, strengthening activities involving internal rotation must be avoided. Initially patients will use a sling to protect the implants and allow for proper healing. The rehabilitation program will

gradually progress to more strengthening and control type exercises. General time frames are given for reference to the average, but individual patients will progress at different rates depending on their age, associated injuries, pre-injury health status, rehabilitation compliance and injury severity.

The goal of these procedures is to restore your daily function and allow you to return to an active healthy lifestyle. You will have some permanent restrictions to minimize chance of associated injury or implant failure. These include contact sports such as basketball, soccer, football, martial arts, heavy lifting, chopping wood, repetitive overhead throwing and heavy labor.

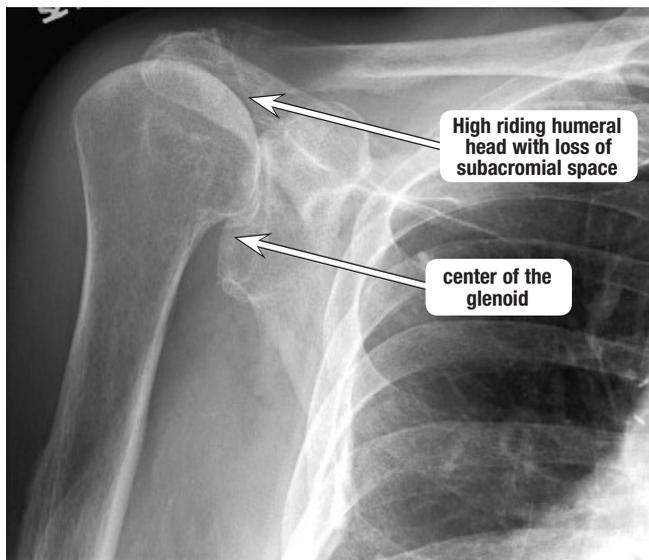


Figure 3 This is a radiograph of a patient with a chronic rotator cuff tear and rotator cuff arthropathy. Note the “high riding humeral head”, you can notice the humeral head is significantly above the center of the glenoid fossa with loss of subacromial space.



Figure 4 Shoulder (glenohumeral) degenerative joint disease. Note that although the humeral head is centered there is a significant loss of joint space. There is also presence of spurring and sclerosis.

Shoulder Arthroplasty

PHASE I (surgery to 4 weeks after surgery)

Appointments	<ul style="list-style-type: none"> • Physician appointment within 1 week of surgery • Rehabilitation appointments begin within 1 week of surgery
Rehabilitation Goals	<ul style="list-style-type: none"> • Reduce pain and swelling in the post-surgical shoulder • Maintain active range of motion of the elbow, wrist and neck • Protect healing of repaired tissues and implanted devices
Precautions	<ul style="list-style-type: none"> • Use sling continuously except while doing therapy or light, protected activities – such as desk work, for 4 weeks • Wear sling while sleeping for 6 weeks • No active shoulder motion for 4 weeks, all planes • No active internal rotation for 6 weeks • External rotation range of motion limited to 20 degrees • Relative rest to reduce inflammation
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Elbow, wrist and neck active range of motion • Ball squeezes • Passive and active assistive range of motion for shoulder flexion and abduction to patient tolerance • Codmans/Pendulum exercises • Painfree submax isometrics for shoulder flexion, abduction, extension and external rotation
Cardiovascular Fitness	<ul style="list-style-type: none"> • Walking and/or stationary bike with sling on • No treadmill
Progression Criteria	<ul style="list-style-type: none"> • The patient must be at least 4 weeks post-operative

PHASE II (begin after meeting Phase 1 criteria, usually 4-8 weeks after surgery)

Appointments	<ul style="list-style-type: none"> • Rehabilitation appointments are usually one time every week
Rehabilitation Goals	<ul style="list-style-type: none"> • Controlled restoration of passive and active assistive range of motion • Activate shoulder and scapular stabilizers in a protected position of 0 degrees to 30 degrees of shoulder abduction) • Correct postural dysfunctions
Precautions	<ul style="list-style-type: none"> • Wean out of the sling slowly based on the safety of the environment during weeks 5 and 6. Discontinue use of the sling by the end of week 6 • Wear sling while sleeping for 6 weeks • No active internal rotation for 6 weeks • External rotation range of motion limited to 30 degrees weeks 5 and 6, then to 45 degrees for weeks 7 and 8

Shoulder Arthroplasty

Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Passive and active assistive range of motion for the shoulder in all cardinal planes (shoulder internal rotation should be passive only until 6 weeks) • Pain free, progressive, low resistance shoulder isotonic • Gentle, low velocity rhythmic stabilizations to patient tolerance • Gentle shoulder mobilizations as needed • Scapular strengthening with the arm in neutral • Cervical spine and scapular active range of motion • Postural exercises • Core strengthening
Cardiovascular Fitness	<ul style="list-style-type: none"> • Walking and stationary bike • No treadmill or stairmaster • Avoid running and jumping due to forces that can occur at landing
Progression Criteria	<ul style="list-style-type: none"> • The patient must be at least 8 weeks post-operative

PHASE III (begin after meeting Phase 11 criteria, usually 8 weeks after surgery)

Appointments	<ul style="list-style-type: none"> • Physician appointment 8 to 10 weeks after surgery • Rehabilitation appointments are one time every 1-2 weeks
Rehabilitation Goals	<ul style="list-style-type: none"> • Functional shoulder active range of motion in all planes • Normal (rated 5/5) strength for shoulder internal rotators and external rotators with the shoulder in 0degrees of abduction • Correct any postural dysfunction
Precautions	<ul style="list-style-type: none"> • External rotation range of motion limited to 60 degrees
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Shoulder internal rotation and external rotation with theraband or weights that begin at 0 degrees of shoulder abduction - gradually increase shoulder abduction as strength improves • Open kinetic chain shoulder rhythmic stabilizations in supine (eg. stars or alphabet exercises) • Gentle closed kinetic chain shoulder and scapular stabilization drills – wall ball circles and patterns • Proprioceptive neuromuscular facilitation patterns • Side lying shoulder flexion • Scapular strengthening • Active, active assistive, and passive range of motion at the shoulder as needed • Core strengthening • Begin trunk and hip mobility exercises

Shoulder Arthroplasty

Cardiovascular Fitness	<ul style="list-style-type: none"> • Walking and stationary bike No treadmill, stairmaster or swimming • Avoid running and jumping until the athlete has full rotator cuff strength in a neutral position due to forces that can occur at landing
Progression Criteria	<ul style="list-style-type: none"> • The patient must be at least 12 weeks post-operative

PHASE IV (begin after meeting Phase III criteria, usually 12 weeks after surgery)

Appointments	<ul style="list-style-type: none"> • Physician appointment 12 weeks after surgery • Rehabilitation appointments are one time every 2-3 weeks
Rehabilitation Goals	<ul style="list-style-type: none"> • Normal (rated 5/5) rotator cuff strength and endurance at 90 degrees of shoulder abduction and scaption • Advance proprioceptive and dynamic neuromuscular control retraining • Achieve maximal shoulder external rotation (no limitations) • Correct postural dysfunctions with work and sport specific tasks • Develop strength and control for movements required for work or sport
Precautions	<ul style="list-style-type: none"> • Post-rehabilitation soreness should alleviate within 12 hours of the activities
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Multi-plane shoulder active range of motion with a gradual increase in the velocity of movement while making sure to assess scapular rhythm • Shoulder mobilizations as needed • Rotator cuff strengthening in 90 degrees of shoulder abduction, and overhead (beyond 90 degrees of shoulder abduction) • Scapular strengthening and dynamic neuromuscular control in open kinetic chain and closed kinetic chain positions • Core and lower body strengthening
Cardiovascular Fitness	<ul style="list-style-type: none"> • Walking, stationary bike, and stairmaster • No treadmill or swimming. • May begin light jogging and running if the patient has normal (rated 5/5) rotator cuff strength in neutral and normal shoulder active range of motion
Progression Criteria	<ul style="list-style-type: none"> • Full shoulder active range of motion in all planes and multi-plane movements • Normal (rated 5/5) strength at 90 degrees of shoulder abduction

Shoulder Arthroplasty

PHASE V (begin after meeting Phase IV criteria, usually 18 weeks after surgery)

Appointments	<ul style="list-style-type: none"> • Physician appointment about 18 weeks after surgery and about 24 weeks after surgery • Rehabilitation appointments are one time every 2-3 weeks
Rehabilitation Goals	<ul style="list-style-type: none"> • Normal (rated 5/5) rotator cuff strength at 90 degrees of shoulder abduction • Advance proprioceptive and dynamic neuromuscular control retraining • Correct postural dysfunctions with work and sport specific tasks • Develop strength and control for movements required for work or sport • Develop work capacity cardiovascular endurance for work and/or sport
Precautions	<ul style="list-style-type: none"> • Post-rehabilitation soreness should alleviate within 12 hours of the activities
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Multi-plane shoulder active range of motion with a gradual increase in the velocity of movement while making sure to assess scapular rhythm • Shoulder mobilizations as needed • Rotator cuff strengthening in 90 degrees of shoulder abduction as well as in provocative positions and work/sport specific positions, including eccentric strengthening, endurance and velocity specific exercises • Scapular strengthening and dynamic neuromuscular control in overhead positions and work/sport specific positions • Work and Sport specific strengthening • Core and lower body strengthening • Work specific program, golf program, swimming program or overhead racquet program as needed
Cardiovascular Fitness	<ul style="list-style-type: none"> • Design to use work or sport specific energy systems
Progression Criteria	<ul style="list-style-type: none"> • The patient may return to sport after receiving clearance from the orthopedic surgeon and the physical therapist or athletic trainer • Return to sport decisions are based on meeting the goals of this phase

Reverse Ball and Socket Arthroplasty

Reverse Ball and Socket Arthroplasty PHASE I (surgery to 4 weeks after surgery)

Appointments	<ul style="list-style-type: none"> • Physician appointment within 1 week of surgery • Rehabilitation appointments begin within 1 week of surgery
Rehabilitation Goals	<ul style="list-style-type: none"> • Reduce pain and swelling in the post-surgical shoulder • Maintain active range of motion of the elbow, wrist and neck • Protect healing of repaired tissues and implanted devices
Precautions	<ul style="list-style-type: none"> • Use sling continuously except while doing therapy or light, protected activities – such as desk work, for 4 weeks • Wear sling while sleeping for 6 weeks • No active shoulder motion for 4 weeks, all planes • No active internal rotation for 6 weeks • External rotation range of motion limited to 0 degrees (neutral) • Relative rest to reduce inflammation
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Elbow, wrist and neck active range of motion • Passive and active assistive range of motion for shoulder flexion and abduction to patient tolerance • Codmans/Pendulum exercises • Painfree submax isometrics for shoulder flexion, abduction, extension and external rotation
Cardiovascular Fitness	<ul style="list-style-type: none"> • Walking and/or stationary bike with sling on • No treadmill
Progression Criteria	<ul style="list-style-type: none"> • The patient must be at least 4 weeks post-operative

PHASE II (begin after meeting Phase 1 criteria, usually 4-8 weeks after surgery)

Appointments	<ul style="list-style-type: none"> • Rehabilitation appointments are usually 1 time every week
Rehabilitation Goals	<ul style="list-style-type: none"> • Controlled restoration of passive and active assistive range of motion • Activate shoulder and scapular stabilizers in a protected position of 0degrees to 30 degrees of shoulder abduction) • Correct postural dysfunctions
Precautions	<ul style="list-style-type: none"> • Wean out of the sling slowly based on the safety of the environment during weeks 5 and 6. Discontinue use of the sling by the end of week 6 • Wear sling while sleeping for 6 weeks • No active internal rotation for 6 weeks • External rotation range of motion limited to 20 degrees weeks 5 and 6, then to 45 degrees for weeks 7 and 8

Reverse Ball and Socket Arthroplasty

Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Passive and active assistive range of motion for the shoulder in all cardinal planes (shoulder internal rotation should be passive only until 6 weeks) • Painfree, progressive, low resistance shoulder isotonic – begin Jackins exercises for deltoid strengthening • Gentle, low velocity rhythmic stabilizations to patient tolerance • Gentle shoulder mobilizations as needed • Scapular strengthening with the arm in neutral • Cervical spine and scapular active range of motion • Postural exercises • Core strengthening
Cardiovascular Fitness	<ul style="list-style-type: none"> • Walking and stationary bike • No treadmill or stairmaster • Avoid running and jumping due to forces that can occur at landing
Progression Criteria	<ul style="list-style-type: none"> • The patient must be at least 8 weeks post-operative

PHASE III (begin after meeting Phase 11 criteria, usually 8 weeks after surgery)

Appointments	<ul style="list-style-type: none"> • Physician appointment are 8 to 10 weeks after surgery • Rehabilitation appointments are one time every 1-2 weeks
Rehabilitation Goals	<ul style="list-style-type: none"> • Functional shoulder active range of motion in all planes • Normal (rated 5/5) strength for shoulder internal rotators and deltoid • Correct any postural dysfunction
Precautions	<ul style="list-style-type: none"> • External rotation range of motion limited to 60 degrees
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Shoulder internal rotation • Deltoid strengthening – progression of the Jankins exercises • Open kinetic chain shoulder rhythmic stabilizations in supine (eg. stars or alphabet exercises) • Gentle closed kinetic chain shoulder and scapular stabilization drills – wall ball circles and patterns • Proprioceptive neuromuscular facilitation patterns • Side lying shoulder flexion • Scapular strengthening • Active, active assistive, and passive range of motion at the shoulder as needed • Core strengthening • Begin trunk and hip mobility exercises
Cardiovascular Fitness	<ul style="list-style-type: none"> • Walking and stationary bike No treadmill, stairmaster or swimming • Avoid running and jumping until the athlete has full rotator cuff strength in a neutral position due to forces that can occur at landing
Progression Criteria	<ul style="list-style-type: none"> • The patient must be at least 12 weeks post-operative

Reverse Ball and Socket Arthroplasty

PHASE IV (begin after meeting Phase III criteria, usually 12 weeks after surgery)

Appointments	<ul style="list-style-type: none"> • Physician appointments are 12 weeks after surgery • Rehabilitation appointments are one time every 2-3 weeks
Rehabilitation Goals	<ul style="list-style-type: none"> • Normal strength and endurance of deltoid at 90 degrees of shoulder abduction and scaption • Advance proprioceptive and dynamic neuromuscular control retraining • Achieve 75 degrees of shoulder external rotation • Correct postural dysfunctions with work and sport specific tasks • Develop strength and control for movements required for work or sport
Precautions	<ul style="list-style-type: none"> • Post-rehabilitation soreness should alleviate within 12 hours of the activities
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Multi-plane shoulder active range of motion with a gradual increase in the velocity of movement while making sure to assess scapular rhythm • Shoulder mobilizations as needed • Rotator cuff strengthening in 90 degrees of shoulder abduction, and overhead (beyond 90 degrees of shoulder abduction) • Scapular strengthening and dynamic neuromuscular control in open kinetic chain and closed kinetic chain positions • Core and lower body strengthening
Cardiovascular Fitness	<ul style="list-style-type: none"> • Walking, stationary bike, and stairmaster • No treadmill or swimming. • May begin light jogging and running if the patient has normal (rated 5/5) rotator cuff strength in neutral and normal shoulder active range of motion
Progression Criteria	<ul style="list-style-type: none"> • Full shoulder active range of motion in all planes and multi-plane movements • Normal (rated 5/5) strength at 90degrees of shoulder abduction

PHASE V (begin after meeting Phase IV criteria, usually 18 weeks after surgery)

Appointments	<ul style="list-style-type: none"> • Physician appointment about 18 weeks after surgery and about 24 weeks after surgery • Rehabilitation appointments are one time every 2-3 weeks
Rehabilitation Goals	<ul style="list-style-type: none"> • Normal strength and endurance of deltoid at 90degrees of shoulder abduction and scaption • Advance proprioceptive and dynamic neuromuscular control retraining • Correct postural dysfunctions with work and sport specific tasks • Develop strength and control for movements required for work or sport • Develop work capacity cardiovascular endurance for work and/or sport
Precautions	<ul style="list-style-type: none"> • Post-rehabilitation soreness should alleviate within 12 hours of the activities

Reverse Ball and Socket Arthroplasty

Suggested Therapeutic Exercise	<ul style="list-style-type: none"> • Multi-plane shoulder active range of motion with a gradual increase in the velocity of movement while making sure to assess scapular rhythm • Shoulder mobilizations as needed • Rotator cuff strengthening in 90degrees of shoulder abduction as well as in provocative positions and work/sport specific positions, including eccentric strengthening, endurance and velocity specific exercises • Scapular strengthening and dynamic neuromuscular control in overhead positions and work/sport specific positions • Work and Sport specific strengthening • Core and lower body strengthening • Work specific program, swimming program or overhead racquet program as needed
Cardiovascular Fitness	<ul style="list-style-type: none"> • Design to use work or sport specific energy systems
Progression Criteria	<ul style="list-style-type: none"> • The patient may return to sport after receiving clearance from the orthopedic surgeon and the physical therapist or athletic trainer • Return to sport decisions are based on meeting the goals of this phase

These rehabilitation guidelines were developed collaboratively by Marc Sherry, PT, DPT, LAT, CSCS (msherry@uwhealth.org) and the UW Health Sports Medicine Physician group.

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