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Dx: ☐ Right ☐ Left

Patient Name: _____

Date of Surgery: _____

PT/OT: Evaluate and treat. Follow the following protocol.

Signature/Date: _____

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Reverse Total Shoulder Arthroplasty Protocol

General Information:

Reverse or Inverse Total Shoulder Arthroplasty (rTSA) is designed specifically for the treatment of glenohumeral (GH) arthritis when it is associated with irreparable rotator cuff damage, complex fractures as well as for a revision of a previously failed conventional Total Shoulder Arthroplasty (TSA) in which the rotator cuff tendons are deficient. It was initially designed and used in Europe in the late 1980s by Grammont; and only received FDA approval for use in the United States in March of 2004.

The rotator cuff is either absent or minimally involved with the rTSA; therefore, the rehabilitation for a patient following the rTSA is different than the rehabilitation following a traditional TSA. The surgeon, physical therapist and patient need to take this into consideration when establishing the postoperative treatment plan.
Important rehabilitation management concepts to consider for a postoperative physical therapy rTSA program are:

- Joint protection: There is a higher risk of shoulder dislocation following rTSA than a conventional TSA.
    - **Avoidance of shoulder extension past neutral and the combination of shoulder adduction and internal rotation should be avoided for 12 weeks postoperatively.**
    - **Patients with rTSA don't dislocate with the arm in abduction and external rotation. They typically dislocate with the arm in internal rotation and adduction in conjunction with extension. As such, Tucking in a shirt or performing bathroom / personnel hygiene with the operative arm is a particularly dangerous activity particularly in the immediate peri-operative phase.**
- Deltoid function: Stability and mobility of the shoulder joint is now dependent upon the deltoid and periscapular musculature. This concept becomes the foundation for the postoperative physical therapy management for a patient that has undergone rTSA.
- Function: As with a conventional TSA, maximize overall upper extremity function, while respecting soft tissue constraints.
- ROM: Expectation for range of motion gains should be set on a case-by-case basis depending upon underlying pathology. Normal/full active range of motion of the shoulder joint following rTSA is not expected.

Reverse Total Shoulder Arthroplasty Biomechanics:

The rTSA prosthesis reverses the orientation of the shoulder joint by replacing the glenoid fossa with a glenoid base plate and glenosphere and the humeral head with a shaft and concave cup. This prosthesis design alters the center of rotation of the shoulder joint by moving it medially and inferiorly. This subsequently increases the deltoid moment arm and deltoid tension, which enhances both the torque produced by the deltoid as well as the line of pull / action of the deltoid. This enhanced mechanical advantage of the deltoid compensates for the deficient RC as the deltoid becomes the primary elevator of the shoulder joint. This results in an improvement of shoulder elevation and often individuals are able to raise their upper extremity overhead.

Figure 1. Illustration of a left shoulder with rotator cuff arthropathy. The superiorly migrated humeral head indicates rotator cuff deficiency.



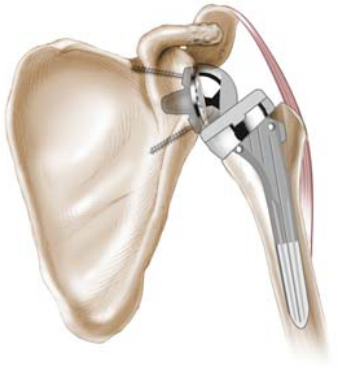
Figure 2. Reverse Total Shoulder Arthroplasty Components. The prosthesis has 5 parts: the glenoid base, the glenosphere, a polyethylene cup, humeral neck, and the humeral



Figure 3. Anterior Posterior radiography of a right shoulder (A) and an illustration of a left shoulder (B) after reverse total shoulder arthroplasty.



A



B

Reverse Total Shoulder Arthroplasty Protocol:

The intent of this protocol is to provide the physical therapist with a guideline/treatment protocol for the postoperative rehabilitation management for a patient who has undergone a Reverse Total Shoulder Arthroplasty (rTSA). It is by no means intended to be a substitute for a physical therapist's clinical decision making regarding the progression of a patient's postoperative rehabilitation based on the individual patient's physical exam/findings, progress, and/or the presence of postoperative complications. If the physical therapist requires assistance in the progression of a postoperative patient who has had rTSA the therapist should consult with the referring surgeon.

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 appropriate shoulder joint alignment.

Shoulder Dislocation Precautions:

- **No shoulder motion behind back. (NO combined shoulder adduction, internal rotation, and extension.)**
- **No glenohumeral (GH) extension beyond neutral.**

*****Precautions should be implemented for 12 weeks postoperatively unless surgeon specifically advises patient or therapist differently.

Surgical Considerations:
The surgical approach needs to be considered when devising the postoperative plan of care.

- Traditionally rTSA procedure is done via a typical deltopectoral approach, which minimizes surgical trauma to the anterior deltoid.

- Some surgeons perform this procedure via a superior approach, retracting the anterior deltoid from the anterior lateral one third of the clavicle. This allows for superior exposure to the GH joint between the retracted anterior deltoid and the clavicle. Upon surgical closure the anterior deltoid is sutured back to its anatomical location. In these cases early deltoid

activity is contraindicated. We recommend a variation of the below protocol for patients who have had a superior approach. Patient's should use a sling for 4-6 weeks, not to begin deltoid isometrics for at least four weeks postoperatively, not to begin active range of motion (AROM) flexion for at least six weeks, and not begin deltoid strengthening for at least 12 weeks post operatively.

- The start of this protocol is delayed 3-4 weeks following rTSA for a revision and/or in the presence of poor bone stock based on the surgeon's assessment of the integrity of the surgical repair.

Progression to the next phase based on Clinical Criteria and Time Frames as Appropriate.

Phase I – Immediate Post Surgical Phase/Joint Protection (0-6 weeks):

Goals:

- Patient and family independent with:
  - Joint protection
  - Passive range of motion (PROM)
  - Assisting with putting on/taking off sling and clothing
  - Assisting with home exercise program (HEP)
  - Cryotherapy
- Promote healing of soft tissue / maintain the integrity of the replaced joint.
- Enhance PROM.
- Restore active range of motion (AROM) of elbow/wrist/hand.
- Independent with activities of daily living (ADL's) with modifications.
- Independent with bed mobility, transfers and ambulation or as per pre-admission status.

Phase I Precautions:

- Sling is worn for 3-4 weeks postoperatively. The use of a sling often may be extended for a total of 6 weeks, if the current rTSA procedure is a revision surgery.
- While lying supine, the distal humerus / elbow should be supported by a pillow or towel roll to avoid shoulder extension. Patients should be advised to "always be able to visualize their elbow while lying supine."
- No shoulder AROM.
- No lifting of objects with operative extremity.
- No supporting of body weight with involved extremity.
- Keep incision clean and dry (no soaking/wetting for 2 weeks); No whirlpool, Jacuzzi, ocean/lake wading for 4 weeks.

Acute Care Therapy (Day 1 to 4):

- Begin PROM in supine after complete resolution of interscalene block.
    - Forward flexion and elevation in the scapular plane in supine to 90 degrees.
    - External rotation (ER) in scapular plane to available ROM as indicated by operative findings. Typically around 20-30 degrees.
    - No Internal Rotation (IR) range of motion (ROM).
- Active/Active Assisted ROM (A/AAROM) of cervical spine, elbow, wrist, and hand.
- Begin periscapular sub-maximal pain-free isometrics in the scapular plane.
- Continuous cryotherapy for first 72 hours postoperatively, then frequent application (4-5 times a day for about 20 minutes).
- Insure patient is independent in bed mobility, transfers and ambulation
- Insure proper sling fit/alignment/ use.
- Instruct patient in proper positioning, posture, initial home exercise program
- Provide patient/ family with written home program including exercises and protocol information.

Day 5 to 21:

- Continue all exercises as above.
- Begin sub-maximal pain-free deltoid isometrics in scapular plane (avoid shoulder extension when isolating posterior deltoid.)
- Frequent (4-5 times a day for about 20 minutes) cryotherapy.

3 - 6 Weeks:

- Progress exercises listed above.
- Progress PROM:
    - Forward flexion and elevation in the scapular plane in supine to 120 degrees.
    - ER in scapular plane to tolerance, respecting soft tissue constraints.
- Gentle resisted exercise of elbow, wrist, and hand.
- Continue frequent cryotherapy.

Criteria for progression to the next phase (Phase II):

- Tolerates shoulder PROM and isometrics; and, AROM- minimally resistive program for elbow, wrist, and hand.
- Patient demonstrates the ability to isometrically activate all components of the deltoid and periscapular musculature in the scapular plane.

Phase II –Active Range of Motion / Early Strengthening Phase (Week 6 to 12):

Goals:

- Continue progression of PROM (full PROM is not expected).
- Gradually restore AROM.
- Control pain and inflammation.
- Allow continued healing of soft tissue / do not overstress healing tissue.
- Re-establish dynamic shoulder and scapular stability.

Precautions:

- Continue to avoid shoulder hyperextension.
- In the presence of poor shoulder mechanics avoid repetitive shoulder AROM exercises/activity.
- Restrict lifting of objects to no heavier than a coffee cup.
- No supporting of body weight by involved upper extremity.

6 – 8 Weeks:

- Continue with PROM program.
- At 6 weeks post op start PROM IR to tolerance (not to exceed 50 degrees) 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 (Grade I and II).
- Continue use of cryotherapy as needed.
- Patient may begin to use hand of operative extremity for feeding and light activities of daily living including dressing, washing.

9 – 12 Weeks:

- Continue with above exercises and functional activity progression.
- Begin AROM supine forward flexion and elevation in the plane of the scapula with light weights (1-3lbs. or .5-1.4 kg) at varying degrees of trunk elevation as appropriate. (i.e. supine lawn chair progression with progression to sitting/standing).
- Progress to gentle glenohumeral IR and ER isotonic strengthening exercises in sidelying postion with light weight (1-3lbs or .5-1.4kg) and/or with light resistance resistive bands or sport cords.

Criteria for progression to the next phase (Phase III):

- Improving function of shoulder.
- Patient demonstrates the ability to isotonically activate all components of the deltoid and periscapular musculature and is gaining strength.

Phase III – Moderate strengthening (Week 12 +)

Goals:

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

Precautions:

- No lifting of objects heavier than 2.7 kg (6 lbs) with the operative upper extremity
- No sudden lifting or pushing activities.

12 – 16 Weeks:

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

Phase IV – 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:**

  - Continued strength gains
  - 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:

- Patient is able to maintain pain free shoulder AROM demonstrating proper shoulder mechanics. (Typically 80 – 120 degrees of elevation with functional ER of about 30 degrees.)
- Typically able to complete light household and work activities.

Protocol Courtesy of:

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