

## **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.

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.

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 / persona hygiene with the operative arm is an especially 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.
- 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.

This protocol provides the therapists with a general guideline for patients after this type of procedure. Each patient's surgery and postoperative progress may be different, and this protocol is not intended to substitute for one's clinical decision making based on exam findings, individual progress, and/or the presence of post-operative complications. If a clinician requires assistance in the progression of a post-operative patient they should consult with the referring surgeon.

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

The **scapular plane** is defined as the shoulder positioned in 30 degrees of abduction and forward

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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.
- Because the chance of dislocation and other complications are much higher in rTSA for revision cases, the **start of this protocol is delayed 3-4 weeks in such cases.**

**Week 1-4**

- Shoulder immobilizer at all times except dressing, shower, and elbow/wrist exercises
  - The use of a sling often may be extended for a total of 6 weeks, if the current rTSA procedure is a revision surgery.
- Frequent cryotherapy; around the clock in the first week; then progress to 4-5 times a day for 30-60 minutes by week 3-6
- active range of motion (AROM) of elbow/wrist/hand allowed
- 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.

**Week 5-6:**

- Wean shoulder immobilizer
- Initiate 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.
- No Internal Rotation (IR) range of motion (ROM).
- Initiate active ROM when sling is weaned completely
- Begin periscapular sub-maximal pain-free isometrics in the scapular plane.
- Instruct patient in proper positioning, posture, initial home exercise program

**Week 7-10**

- Continue PROM and full AROM
  - PROM IR to tolerance, not to exceed 50 deg
  - 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.
- Initiate gentle scapulothoracic rhythmic stabilization and alternating isometrics in supine as appropriate. Minimize deltoid recruitment during all activities / exercises.
- Progress strengthening of elbow, wrist, and hand.
- Gentle glenohumeral and scapulothoracic joint mobilizations as indicated

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- Patient may begin to use hand of operative extremity for feeding and light activities of daily living including dressing, washing.
- Due to the potential of an acromion stress fracture one needs to continuously monitor the exercise and activity progression of the deltoid. A sudden increase of deltoid activity during rehabilitation could lead to excessive acromion stress. A gradually progressed pain free program is essential.
- 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.

**Week 11-12**

- Begin gentle glenohumeral IR and ER sub-maximal pain free isometrics.
- Begin gentle periscapular and deltoid sub-maximal pain free isotonic strengthening exercises. 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 position with light weight (1-3lbs or .5-1.4kg) and/or with light resistance resistive bands or sport cords.
- No lifting of objects heavier than 2.7 kg (6 lbs) with the operative upper extremity
- No sudden lifting or pushing activities.

**Week 12 to Week 16:**

- Continue with the previous program as indicated.
- Progress to gentle resisted flexion, elevation in standing as appropriate.
- Continued home program (4+ months postop)