Reverse Total Shoulder Arthroplasty (rTSA) Protocol
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The shoulder reverse arthroplasty procedure is performed to improve function, increase active range of motion and reduce pain of the shoulder. The following is a guideline for progression of post-operative treatment.

Reverse 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.
    - o Avoidance of shoulder extension past neutral and the combination of shoulder adduction and internal rotation should be avoided for 12 weeks postoperatively.
    - o 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.

Phase I - Immediate Post Surgical Phase/Joint Protection (Day 1-6 weeks):
Goals:
- Patient and family independent with:
    - o Joint protection
    - o 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 Weeks to 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.

Week 6 to Week 8:

- 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.
    - o Forward flexion and elevation in scapular plane in supine with progression to sitting/standing.
    - o 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.

Week 9 to Week 12:

- 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.

Week 12 to Week 16:

- 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.

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SHOULDER ARTHROPLASTY PROTOCOL

The shoulder arthroplasty procedure is performed to improve function, increase active range of motion and reduce pain of the shoulder. The following is a guideline for progression of post-operative treatment.

General Information

- Time required for full recovery is 9-12 months.
- Accelerating rehabilitation for "fast healers" may inhibit results and lead to recurrent problems or complications.
- Patients may never regain full, normal motion, but patients will be encouraged to reach their maximal level of function.

Precautions

- In this procedure, the subscapularis is detached for exposure of the glenohumeral joint and then reattached after the surgery is complete. This reattachment must be protected for 6 weeks. During this time, strengthening activities involving internal and external rotation must be avoided.

Immobilization

- Sling should be worn for the first 48-72 hours.
- After 3 days, sling can be removed for light activity such as desk work.
- Sling should be worn as needed during the day, whenever the patient is active or in an unprotected environment; it should always be worn at night for the first 6 weeks.
- Discontinue sling completely at 6 weeks.

1st Post-Op Visit

1. Wound inspection
2. Patient education
   - **No active shoulder motion for 4 weeks, all planes**
   - **No active internal rotation for 6 weeks**
   - Sling use as directed by physician
   - Keep wound dry
   - Icing 3 times/day for 20 minutes
3. Exercise
   - Pendulum exercise without weight
     - Clockwise
     - Counterclockwise
     - Side-to-side
     - Front & back
   - AAROM exercise - to patient tolerance - with cane and/or table slides
     - Flexion
     - Abduction
     - **External rotation to 30° only or as directed by physician**

- Plyoball diagonal patterns
- Fitter
  - Side-to-side
  - Front & back
- Progress weight and range of motion as tolerated by patient, with closed- and open-chain exercises and proprioceptive activities

3. Glenohumeral joint mobilization - as indicated
4. Modalities - PRN
5. Ice

12 Weeks Post-Op

1. Should have full AROM, ER to 60°; if not, begin passive stretch to achieve full ROM (forward elevation, abduction, IR, ER)
2. Exercise
   - Progressive resistive exercise - continue as previous, adding:
     - Body Blade diagonals - progress to single-leg stance
     - Push-up plus in push-up position
     - Step-ups in push-up position
3. Glenohumeral joint mobilization - as indicated
4. Modalities - PRN
5. Ice

16 Weeks Post-Op

1. Should have full AROM, ER to 75°; continue passive stretch to achieve full ROM
2. Exercise
   - Continue with exercise program, progressing with weight & endurance as tolerated
3. Grade I/II glenohumeral joint mobilization - as indicated
4. Modalities - PRN
5. Ice
6. Released to perform activities as tolerated

24 Weeks Post-Op

1. Progression to full activity as directed by physician

Adapted from MedSport: Ann Arbor, Michigan

3. Modalities - PRN
4. Ice

6 Weeks Post-Op

1. Discontinue sling use
2. Exercise
   - AROM
     - All planes - **limit external rotation to 45°**
     - UBE, forward/reverse and standing off to side clockwise and counterclockwise
   - Progressive resistive exercise - continue as previous, adding:
     - Shoulder internal/external rotation with low resistance Theraband (limit ER to 45°)
     - Wall push-up plus, hand in neutral position
     - Rhythmic stabilization
   - Body Blade
     - One-handed grip in neutral position
     - Two-handed grip in front
     - Opposite hand diagonal pattern
3. Grade I/II glenohumeral joint mobilization - as indicated
4. Modalities - PRN
5. Ice

8 Weeks Post-Op

1. Full PROM, ER to 60°, and advance to full AROM (ER 60°); able to add stretching in forward elevation (if lacking)
2. Exercise
   - Progressive resistive exercise - continue as previous, adding:
     - *Low resistance/high repetition:*

       Flexion — Abduction
       Supraspinatus (limit to 70°) — Prone fly
       Scapular retraction — Prone extension
     - Wall push-up plus, hands in neutral position
   - Body Blade
     - One-handed grip, abduction to 90°
     - Two-handed grip, flexion to 90°
   - Plyoball
     - Circles - CW and CCW, 1 minute each direction
     - Squares - CW and CCW, 1 minute each direction
3. Grade I/II glenohumeral joint mobilization - as indicated
4. Modalities - PRN
5. Ice

10 Weeks Post-Op

1. Full PROM, ER to 60°; continue stretching (forward elevation, abduction, IR, ER)
2. Exercise
   - Progressive resistive exercise - continue as previous, adding:
     - Kneeling push-up
     - Step-up push-up in quadruped position

- AROM exercise
  - Elbow flexion/extension
  - Wrist flexion/extension and supination/pronation
  - Shrugs/retractions

4. Ice
5. Modalities - PRN

1 Week Post-Op

1. Wound check
   - If wound is sealed, it is okay to shower but not soak
2. Exercise
   - Pendulum exercise
   - AAROM exercise - to patient tolerance - with cane
   - Isometric exercise
     - Flexion/extension
     - Abduction
     - External rotation
   - Progressive resistive exercise
     - Shoulder shrugs
     - Scapular retraction - prone
     - Wrist supination/pronation
     - Triceps/shoulder extension
     - Gripping exercises
     - Wrist flexion/extension
3. Modalities - PRN
4. Ice

2 Weeks Post-Op

1. Wound check, sutures out
2. Exercise
   - AAROM
     - UBE, forward/reverse
     - With cane - progress to finger ladder/wall climbs/pulley system
     - Pulleys for home exercise program
   - Pendulum exercise with light weight
   - Isometrics - as previous
   - Progressive resistive exercise - as previous
3. Modalities - PRN
4. Ice

4 Weeks Post-Op

1. Scar mobility
2. Exercise
   - AROM
     - All planes - **limit ER to 30° or as directed by physician**
     - UBE, forward/reverse
   - Progressive resistive exercise - continue as previous, adding:
     - Serratus punch - supine, without weight