Appendix A: *The American Society Of Shoulder And Elbow Therapists Arthroscopic Rotator Cuff Repair Rehabilitation Guide*

Phase 1
(POD 1 to ~ POW 6)

GOALS:

- Maintain integrity of repair
- Minimize pain and inflammation
- Achieve staged range of motion (ROM) goals
- Educate the patient including postoperative precautions, modification of ADL''s, and activity progression.
- Normalize scapula position and mobility

INTERVENTIONS TO AVOID WITH INVOLVED SHOULDER:

- No active range of motion (AROM) of shoulder
- No lifting of objects
- No excessive stretching or sudden movements
- No supporting of body weight by hands
- No aggressive or provocative passive range of motion (PROM) exercises

SPECIFIC INTERVENTIONS:

Activities of primary importance:

1. Patient education (see patient education section below)
2. Protection of repair (see above interventions to avoid)
3. Achieve staged ROM goals utilizing ROM activities demonstrating an EMG activity level $\leq$15%
4. Minimize inflammation
5. Control pain with cryotherapy, prescribed medications, modalities

Activities of secondary importance:

1. Normalize scapular position and mobility
2. ROM of the elbow, wrist, hand and cervical spine

Immobilization: (Timeframe adjusted based on size of tear, tissue integrity, and surgeon preference)

- Sling immobilization is typically 4-6 weeks, followed by a gradual weaning from the sling in controlled environments for an additional 2 weeks with goal of being out of the sling by POW 6-8.

Patient Education:

- Explain nature of the surgery
- Clarify interventions to avoid (listed above)
- Explain that lack of pain does not necessarily mean lack of stress on the repair
- Discuss precautions specific to the nature of the patient's surgical repair
- Emphasize importance of meeting but not greatly exceeding staged ROM goals
- Disclose importance of tissue healing

- Exhibit proper sling use
- Limit use of upper extremity for activities of daily living (ADLs)

Pain Management:
- Activity modification/restriction
- Proper use of sling
- Cryotherapy
- Gentle exercise intensity
- Modalities (TENS/ electrical stimulation) PRN
- Prescribed or over the counter medications per surgeon

PROM / Flexibility:
The start of shoulder PROM may be delayed up to 6 weeks post operatively based on surgeon preference, large or massive tear size, and/or poor tissue quality.

POD 1-10
- Patient education
- Pendulum (small circle or hangs)
- Elbow, wrist, and hand AROM, no weights
    - Only PROM of the elbow may be specified if concomitant biceps tenodesis/tenotomy performed.

POW 1-3
- Continue with above
- Passive forward elevation (PFE) in the plane of scapula using only exercises with ≤ 15% EMG activity level
    - Forward bow
    - Therapist assisted PFE (seated / supine)
    - CPM in PFE
    - Patient self-assisted supine PFE using opposite hand
- Passive external rotation (PER) in approximately 20° abduction
    - All PER exercises studied have demonstrated ≤15% EMG activity level for the supraspinatus.
    - Note that the subscapularis has not been evaluated.

POW 3-6
- Progress PFE and PER within staged ROM goals using only activities with ≤ 15% EMG activity level
- May begin joint mobilizations grade I & II for pain relief / relaxation as indicated for all shoulder girdle joints (GH, SC, AC, ST)
- May allow slow speed aquatic therapy for improving PROM, no swimming strokes
- May progress elbow, wrist, and finger AROM to light strengthening (delay to six weeks post op if with concomitant biceps tenodesis /tenotomy)

MILESTONES (TESTING CRITERIA) TO PROGRESS TO PHASE II

- Appropriate healing of the surgical repair by adhering to the precautions, exercise, and immobilization guidelines.
- Staged ROM goals achieved, but not significantly exceeded
- Minimal to no pain (NPRS: 0– 3/10) with ROM

Phase 2
(~POW 6 to ~ POW 12)

GOALS:

- Promote healing of soft tissue, extra care is needed to not overstress
- Achieve staged ROM goals
- Minimal pain and inflammation
- Initiate light muscle performance activities
- Perform light, non-repetitive ADL's at chest level and below

INTERVENTIONS TO AVOID WITH INVOLVED SHOULDER:

- No active lifting or ADL's that require ROM beyond staged goals
- No supporting of body weight by hands
- No excessive behind the back movements
- No sudden jerking motions
- ROM / stretching significantly beyond staged goals
- Scaption with internal rotation (empty can) at any stage of rehabilitation due to impingement and stress on the cuff repair
- Exercises with EMG activity level $\geq$ 30% (Table 2) which generally includes rotator cuff strengthening exercises with > 2 lbs resistance.

SPECIFIC INTERVENTIONS:

Activities of primary importance:

1. Continue patient education
2. Expand PROM/stretching
3. Achieve staged ROM goals
4. Initiate AAROM to AROM activities to establish basic rotator cuff and scapula neuromuscular control within allowed ROM

Activities of secondary importance:

1. Introduction of light non-repetitive waist and chest level functional activities
2. Light resisted exercises within pain free ROM, emphasizing proper mechanics and avoiding fatigue related loss of form

Immobilization: (timeframes adjusted based on size of tear, integrity of tissue and repair, and surgeon preference) Typically, gradual weaning from sling from POW 6-8

Patient Education:

- Continue education regarding avoiding heavy lifting or quick sudden movements.

- Guide the patient through using the upper extremity for appropriate ADL's in pain free ROM; starting with waist level activities, progressing to shoulder level activities, in some cases limited overhead activities.

Pain Management:
- Continue cryotherapy
- Ensure appropriate use of upper extremity during ADL's
- Ensure appropriate level of therapeutic exercises
- Wean from medications
- Electrical and thermal modalities as needed

PROM / Flexibility:
- Progress PFE and PER ROM within staged goals
  - Continue phase 1 exercises especially if PROM is behind staged ROM goals
  - Progress to flexibility exercises that demonstrate an EMG activity level >15% such as the pulley if they can be performed comfortably with correct mechanics
- Begin PROM exercises in other planes if significant ROM limitations are present due to stiffness (be careful due to direct passive tension on the repair)
  - ER at multiple angles of abduction (45°, 75°, 90°)
  - Horizontal adduction
  - IR
  - Functional behind the back IR
- If capsular restrictions are present, progress as indicated to grades III & IV joint mobilizations for all shoulder girdle joints (GH, SC, AC, ST)
- Address scapulothoracic and trunk mobility limitations. Ensure normal cervical spine ROM and thoracic spine extension to facilitate full upper extremity ROM.

AAROM and AROM Progressing to Muscle Performance and Strengthening
- Progress exercises as they are performed pain free with good shoulder girdle mechanics
- Begin with AAROM or AROM exercises demonstrated to have ≤ 15% EMG activity level that utilize gravity minimized positions and/or short lever arms
  - Towel slide / horizontal dusting
  - AAROM supine wash cloth press-up progressing to AROM supine press-up
  - Side-lying supported active elevation
  - AROM reclined wedge press-up
  - Slow speed aquatic exercises
  - Supine elastic band FE > 90°
- Progress to elevation exercises demonstrated to have 16-29% EMG activity level. The patient is generally in the upright position moving the upper limb with support or assistance progressing to unsupported elevation.
  - AAROM pulley
  - Incline board dusting
  - Ball roll on wall

    - Upright wall slide
    - Upright wand AAROM into FE
    - Upright wand AAROM concentric, independent active lowering
    - Upright unsupported active FE (no external resistance)
- Initiate an AROM progressing to light below chest level strengthening program for the deltoid, rotator cuff, and scapula musculature
    - Do not initiate until overall pain level is appropriately low (0-2/10 NPRS), ROM has achieved staged goals for this phase, and patient can tolerate light ADL's at waist level.
    - Emphasize ER, IR, scapula retraction, and short lever forward elevation
    - EMG evidence suggest that typical activity level for these exercises range from the 16-29% category to the > 50% category based on level of resistance and exercise technique
    - Pain free isotonic, elastic resistance, or closed chain exercises in the 16-29% EMG activity range appear appropriate during phase 2
        - Isotonic exercises in the 16-29% EMG activity level utilize gravity for resistance to no more than 1-2 lbs
        - Elastic resistance exercises in the 16-29% EMG activity level provide no more than 2-3 lbs of resistance by utilizing very light levels of resistance, minimal to no pre-tension, and less than 75% elongation of the band compared to the starting position
        - Closed chain exercises in the 16-29% EMG activity level include the quadruped and triped positions
- Address abnormal scapular mobility as indicated
    - Improve pectoralis minor flexibility if limited
    - Motor learning drills through auditory, visual, or tactile cues
    - Limb supported AROM activities
    - Strengthen scapular retractors and upward rotators
    - Light manual resistance in supported positions

Strength/Endurance:
- Scapula and core strengthening
- Address core stability deficits as indicated

MILESTONES (TESTING CRITERIA) TO PROGRESS TO PHASE III:
- Staged ROM goals achieved with minimal to no pain (NPRS 0-2/10) and without substitution patterns.
- Strengthening activities completed with minimal to no pain (NPRS 0-2/10)
- Appropriate scapular posture statically and dynamically during ROM /functional activities

Phase 3
(~POM 3 to ~ POM 5)

<u>Goals:</u>

- Full P/AROM
- Optimize neuromuscular control
- Gradually restore of shoulder strength, power, and endurance
- Return to ADL's, work, and recreational activities that do **not** require heavy lifting, powerful movements, or repetitive overhead activities

INTERVENTIONS TO AVOID:
- No lifting of objects heavier than 15-20 lbs.
- No sudden lifting, jerking, or pushing activities
- No uncontrolled movements

SPECIFIC INTERVENTIONS:

Activities of primary importance:
- Normalize AROM
- Progressive shoulder girdle strengthening and endurance
- Progressive neuromuscular control exercises

Activities of secondary importance:
- Minimize or eliminate end range glenohumeral joint stiffness
- Eliminate deficits in core and scapular performance

Patient Education:
- Counsel in importance of gradually increasing stress to the shoulder while returning to ADL's, work, and recreational activities
- Education in interventions to avoid (listed above)

Pain Management:
- Continue cryotherapy post activity as needed
- Extend modalities as needed
- Ensure appropriate use of upper extremity during ADL's
- Establish appropriate level of therapeutic exercises

PROM / Flexibility:
- Continue stretching and passive ROM exercises as needed per patient impairments

AROM, Strength, Endurance, and/or Power:
- Continue the phase 2 progressions for below chest level strengthening gradually progressing resistance to be complimentary with the 30-49% EMG activity level.
- Complete the phase 2 elevation progression of gravity minimized elevation to upright supported/assisted elevation to upright unsupported elevation as patients may not have completed this at the beginning of phase 3
- Once phase 2 elevation progression is complete, initiate resisted elevation
    - Ensure that unsupported AROM elevation is pain free and performed without substitution

    - Initially performed in a position of comfort with low stress to the surgical repair (e.g. “Full Can” in the plane of the scapula)
    - Exercises should be progressive in terms of muscle demand / intensity (short lever exercises initially with progression of lever length as appropriate)
    - Exercises should also be progressive in terms of shoulder elevation range
    - Program should focus on relatively low resistance (.5-2 lbs) to keep EMG activity level below 50%.
    - Progressive resisted exercises are matched to the patient’s functional demands
    - Nearly full elevation in the scapula plane should be achieved before elevation in other planes
- Consider other strengthening exercises in the 30-49% EMG activity level based on patient’s functional demands and occasionally progressing select patients to exercises below with no weight or very light weight after post-operative month 4
    - External rotation (ER)/Internal rotation (IR) at various angles of abd
    - Prone Rowing
    - Prone Horizontal Abduction
    - Prone Extension

Neuromuscular Re-education:
- Dynamic stabilization exercises
- Light PNF for cuff /deltoid/scapula (rhythmic stabilization or slow reversal hold)
- Open chain kinesthetic awareness drills (ROM replication, etc.)
- Closed chain activity progression

For most patients following arthroscopic rotator cuff repair, Phase 3 concludes their supervised rehabilitation

MILESTONES (TESTING CRITERIA) TO PROGRESS TO PHASE 4:
- MMT at least 4+/5
- Pain free with basic ADLs and phase 3 strengthening
- Patient work demands or goals for recreational activities requires progressive loads or positions not reached during phase 3 exercises
- Demonstrates adequate shoulder girdle dynamic stability for progression to higher demanding work/sport specific activities.
- Surgeon approval

Phase 4
(~POM 5 to ~ POM 6+)

Goals:
- Maintain full non-painful AROM
- Normalize muscular strength, power, and endurance
- Return to demanding functional activities
- Complete return to sport training

INTERVENTIONS TO AVOID:

- Painful activities
- Activities that result in substitution patterns
- Exercises significantly more stressful / demanding than functional demands
- Exercises that provide a large increase in load compared to previous exercises

SPECIFIC INTERVENTIONS:

Activities of primary importance:

- Progressive neuromuscular control exercises
- Progressive strengthening and endurance exercises
- Exercises that progressively replicate speed and power demands
- Activity specific progression to sport, work, and hobbies

Patient Education:

- Counsel on importance of gradually increasing stress to the shoulder while returning to normal ADL's, work, and recreational activities.
- Educate on specific technique and modifications for weight lifting and overhead activities.

Pain Management:

- Cryotherapy PRN
- Ensure appropriate use, rest/ recovery time of upper extremity during work, recreational hobbies
- Provide appropriate level of therapeutic exercises

PROM/Flexibility:

- Continue stretching and passive ROM exercises as needed per patient impairments

Neuromuscular Re-education:

- Address any remaining deficits of rotator cuff, scapula, or trunk
- Advance proprioceptive, neuromuscular activities

Strength/ Endurance/ Power:

- Continue progression of phase 3 strengthening, increasing use of 50% or greater EMG activity exercises and transition to general upper extremity maintenance program such as the Throwers Ten Program
- Develop an activity specific advanced strengthening progression utilizing the following principles as a guide
    - Integrate activity specific functional movement patterns (i.e. throwing or work specific)
    - Decrease amount of external stabilization provided to shoulder girdle (i.e. unsupported IR and ER in elevated positions)
    - Increase speed of movements

    - Decrease rest time to improve endurance
    - Suggested Exercises
        - T-band standing PNF patterns
        - T-band 90/90 ER/ IR w/ or w/out arm support
        - T-band batting, golf, or tennis forehand / backhand simulation
- Progressive return to weight lifting program emphasizing larger, primary upper extremity muscles
    - Start with relatively light weight and high repetitions (15-25)
    - Gradually increase weight over the course of 6-12 weeks
- May initiate interval sport program after successful 3-6 week period of plyometric program, if appropriate.

MILESTONES (TESTING CRITERIA) TO RETURN TO WORK, HOBBIES, SPORT:

- Clearance from surgeon
- Adequate strength and endurance of rotator cuff and scapular muscles to perform activities with minimal to no pain (NPRS 0-2/10) or difficulty
- Complete functional progression