

PHYSICAL THERAPY PROTOCOL

Isolated Subscapularis Repair Rehabilitation

Arthroscopic Repair — With Concomitant Biceps Tenotomy or Tenodesis

FOR THE PHYSICAL THERAPIST

Overview and Goals

This protocol governs rehabilitation following isolated arthroscopic subscapularis repair, which is commonly performed with concomitant biceps tenotomy or biceps tenodesis to address the long head of the biceps tendon. Isolated subscapularis tears are nearly always associated with subluxation or dislocation of the long head of the biceps tendon through the medial bicipital groove, and one of these procedures is performed in the same operation to prevent recurrent biceps pathology. The phase table below applies to both pathways; the only difference is the elbow flexion restriction in Phase 1, which applies only when tenodesis was performed.

The framework is consistent with the Kennedy 2020 ASSET Consensus Statement on Rehabilitation for Anatomic Total Shoulder Arthroplasty — the closest direct parallel, since TSA requires subscapularis takedown and repair — and the Thigpen 2016 ASSET Consensus on Rotator Cuff Repair Rehabilitation.² No large RCTs exist specifically for isolated subscapularis repair rehabilitation; the literature for general rotator cuff repair predominantly addresses posterosuperior cuff (supraspinatus/infraspinatus) tears, where external rotation is encouraged early.^{3,4} Direct extrapolation to subscapularis repairs requires caution because external rotation is the motion that maximally stresses the subscapularis repair.

Two principles guide rehabilitation. First, protect the subscapularis repair in the early phases through extended sling immobilization (6 weeks), restricted external rotation ($\leq 30^\circ$ in scapular plane $\times$ 6 weeks), avoidance of behind-the-back motion ($\times$ 6 weeks), and deferred internal rotation strengthening (no resisted IR until Week 12). The subscapularis is the primary internal rotator and anterior stabilizer of the glenohumeral joint; passive ER stretches the repair, and active IR loads it directly.^{1,5} Second, follow standard progressive RTC rehabilitation after the protective phase. The 2023 Khalil RCT demonstrated that adding focused subscapularis-specific exercises to standard rehabilitation does not improve outcomes — both groups returned to baseline IR strength by 3 months post-op.⁶ Standard progressive strengthening is sufficient; over-engineering subscap-specific exercise menus is unnecessary.

Progression between phases is criterion-based. Time ranges represent typical windows, not gates. Patients who do not meet criteria should remain in the current phase regardless of elapsed time.

READ BEFORE STARTING — CONFIRM CONCOMITANT BICEPS PROCEDURE

Confirm from the operative report whether biceps tenodesis or biceps tenotomy was performed:

- **Tenodesis** (biceps tendon fixed to humerus or pectoralis tendon): Phase 1 elbow flexion restrictions apply (no active elbow flexion $\times$ 3 weeks; AAROM permitted within sling).
- **Tenotomy** (biceps tendon released without fixation): No elbow flexion restrictions. The elbow may be moved freely from POD 1.
- If a **combined subscapularis + supraspinatus / infraspinatus repair** was performed (multi-tendon tear), use Dr. Roth's Rotator Cuff Repair — Large to Massive Tear protocol instead, which incorporates subscapularis modifications.

Rehabilitation Phases

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PHASE	SLING	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
PHASE 1 Weeks 0–6 <i>Repair protection & passive motion</i>	- Sling with abduction pillow at all times for the full 6 weeks, including at night.^{1,2} - Remove only for prescribed PT, hygiene, and elbow/wrist/hand exercises.	- No active shoulder elevation, abduction, or rotation. - No lifting, pushing, pulling, or reaching. - No support of body weight through the operative arm. If biceps tenodesis: - No active elbow flexion × 3 weeks (AAROM permitted within sling limits); resume AROM elbow flexion at Week 3. If biceps tenotomy: - No elbow flexion restrictions.	- Passive ROM begins POD 1 within pain-free limits.^{1,2} Forward elevation (scapular plane): - Progress 0–120° over Weeks 0–6 ER (scapular plane): ≤ 30° for the full 6 weeks (Kennedy 2020 ASSET TSA default — the safest reference point for subscap repair). Do not exceed 30° regardless of patient comfort. ER at 90° abduction: - None Internal rotation: - Hand to belt-line as tolerated. No PROM behind the back. No cross-body adduction beyond hand-to-opposite-shoulder. Elbow / wrist / hand: - Elbow AAROM gravity-assisted flexion/extension permitted; wrist and hand full AROM	Pain & edema control: - Cryotherapy, NSAIDs per Dr. Roth's instructions, scar mobilization once incisions healed Passive ROM: - Pendulum (Codman) — gentle, gravity-assisted - Supine PROM forward elevation in scapular plane with therapist or contralateral-arm assistance (≤ 120°) - Supine PROM ER in scapular plane with wand (≤ 30°) - Gentle table slides (gravity-eliminated) Scapular sets / isometrics: - Scapular retraction and depression isometrics - Postural awareness training Distal extremity: - Wrist and hand AROM, ball squeezes. Elbow: if tenodesis, AAROM only × 3 weeks (no active flexion against gravity); if tenotomy, full AROM as tolerated. Avoid: - Active shoulder motion of any kind - ER past 30° in scapular plane - ER at 90° abduction - Hand-behind-back motion - Belly-press / bear-hug positions - Active elbow flexion × 3 weeks if tenodesis was performed - Sling-off ambulation in public spaces (fall risk; reflex arm-out reaction strains repair)	- Pain controlled at rest and with prescribed PROM - No anterior shoulder pain with PROM - PROM forward elevation ≥ 120° in scapular plane - PROM ER ≥ 30° in scapular plane (do not exceed) - Tolerates sling weaning at end of Week 6 - Minimum 6 weeks elapsed
PHASE 2 Weeks 6–12 <i>Sling weaning, ROM advancement & AROM introduction</i>	- Discontinue sling at end of Week 6.^{1,2} - May continue use for comfort during long days or crowded environments.	- No resisted internal rotation. - No belly-press / bear-hug positions. - No lifting more than 2–3 lbs with the operative arm. - No aggressive ER stretching.	- Progressive PROM toward full range: Forward elevation: 120° → 160° ER (scapular plane): 30° → 45° (gradually, monitoring for anterior shoulder pain) ER at 90° abduction: - Introduce gradually starting Week 8, target 60° by end of Phase 2 Internal rotation: - Gentle progression to hand-to-lumbar-spine; hand-behind-back motion permitted but progress slowly Cross-body adduction: - Progress to full AAROM / AROM introduced:	PROM and AAROM: - Continue Phase 1 PROM with progressive range - Pulleys, wand exercises - Aquatic therapy: pool-based PROM and AAROM once incisions fully healed AROM progression (mid-Phase 2 onward): - Side-lying supported active elevation - Supine washcloth press-up, supine press-up - Reclined wedge press-up — progressive incline - Standing AROM forward elevation (no weight, short lever) - Wall walks / wall slides - Active elbow flexion (no resistance) — continue progression if tenodesis; no restriction if tenotomy Scapular strengthening (low-load): - Scapular retraction with light resistance band - Rows (low load) - Prone Y, T, W (gravity only) - Postural strengthening Manual therapy:	- Sling discontinued without arm guarding - Full or near-full pain-free PROM - Pain ≤ 2/10 with all prescribed exercises - AROM forward elevation symmetric or approaching symmetric - No anterior shoulder pain with end-range PROM - Minimum 12 weeks elapsed

KEVIN M. ROTH, MD

ORTHOPAEDIC SPORTS MEDICINE

PHASE	SLING	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
			Pulley forward elevation; wand-assisted ER and IR within limits; AROM forward elevation (scapular plane) initiated mid-Phase 2, gravity-eliminated → against gravity; side-lying supported active elevation	Gentle joint mobilization (Grade I–II) and soft-tissue mobilization to scapular / periscapular musculature. Avoid aggressive anterior glenohumeral mobilization that stresses the repair.	
PHASE 3 Weeks 12–16 <i>Strengthening & gradual IR loading</i>	None.	- Belly-press and bear-hug positions remain restricted through Week 16. - Avoid aggressive overhead loading or sport-specific demands.	Full pain-free AROM. Full pain-free PROM. ER at 90° abduction progressed toward 90° as tolerated.	Rotator cuff strengthening initiated (no earlier than Week 12): - Submaximal isometrics in neutral: ER, IR, abduction, flexion (Weeks 12–13)^{3,4,5} - Internal rotation — start cautiously: light theraband IR at 0° abduction (yellow), progress over Weeks 13–16; begin submaximal - External rotation: light theraband ER at 0° abduction - Side-lying dumbbell ER (1–2 lbs initially) - Standing dumbbell ER in scapular plane - Forward punch and forward elevation with light band Scapular & periscapular strengthening: - Progressive rows (high, middle, low) - Prone Y, T, W with light dumbbells - Reverse flys, scapular pull-downs - Wall push-up plus progressions Continue: - Pulleys, AROM exercises, manual therapy as needed for residual capsular restriction Avoid: - Belly-press / bear-hug strengthening positions - Aggressive resisted IR at end-range - Heavy compound lifts	- Tolerates submaximal IR strengthening without anterior pain - Tolerates light isotonic ER without compensation - Smooth scapulohumeral rhythm with active elevation - Pain ≤ 1/10 with all prescribed strengthening - Minimum 16 weeks elapsed
PHASE 4 Weeks 16–24+ <i>Progressive strengthening & return to function</i>	None.	- Resistance progresses gradually. - Heavy overhead loading and sport-specific demands deferred until appropriate criteria are met.	Full pain-free AROM and PROM in all planes.	Progressive RTC strengthening (isotonic): - Internal rotation: theraband progression (yellow → red → green), then dumbbell or cable^{3,4,5} - External rotation: continued progression with band and dumbbell - Combined IR/ER patterns at 90° abduction - Belly-press strengthening introduced at Week 16+ (light load, progressive) - Bear-hug strengthening introduced at Week 16+ (light load, progressive) Scapular & periscapular strengthening: - Progressive rows, reverse flys, lat pull-downs (front, not behind neck)	See <i>Return-to-Activity Criteria</i> section below. Most patients return to weight training, golf, and recreation by ~6 months; throwing sports, tennis, and overhead athletics typically deferred to ~8–12 months.^{1,4}

PHASE	SLING	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
				• Push-up plus progressions → traditional push-ups • Periscapular endurance training Compound movements (later Phase 4): • Seated military press (light load, late phase) • Bicep / tricep strengthening (if tenodesis, the fixation is now fully incorporated; if tenotomy, no restriction applies) • Deltoid strengthening Functional: • Sport- or job-specific training at progressive intensity • Functional progression for manual labor, recreational, or athletic demands • Establish home maintenance program for ongoing strength and ROM gains beyond formal PT	

Procedure-Specific Considerations

External Rotation Is the Protected Motion

The subscapularis is the primary internal rotator and anterior stabilizer of the glenohumeral joint. Passive external rotation stretches the repair across the bicipital groove and onto the lesser tuberosity. Limiting PER to $\leq 30^\circ$ in scapular plane $\times$ 6 weeks is the most important early protection — and it is the central distinguishing feature of subscapularis rehabilitation versus posterosuperior cuff rehabilitation, where ER is encouraged early.^{1,5} Progress ER gradually after Week 6, monitoring for anterior or anterolateral shoulder pain that suggests excessive subscapularis strain.

Standard RTC Rehabilitation Is Sufficient — Don't Over-Engineer Subscap-Specific Exercises

A 2023 RCT (Khalil et al., n = 80, double-blinded) compared standard RTC rehabilitation to a protocol that added focused subscapularis-specific exercises after anatomic TSA (which involves subscapularis takedown and repair). The two groups showed no significant difference in subscapularis strength, function, or patient-reported outcomes; both groups returned to baseline IR strength by 3 months post-op.⁶ This is reassuring — once the protective phase is over (Week 12+), standard progressive RTC strengthening is sufficient. PTs need not over-engineer specialized subscap-targeted exercise menus. Focus on smooth scapulohumeral rhythm, gradual IR loading, and overall RTC strengthening.

Belly-Press & Bear-Hug Positions Avoided Through Week 16

The belly-press position (palm against abdomen, elbow forward) and the bear-hug position (palm on opposite shoulder, elbow forward) maximally load the subscapularis at end-range internal rotation. These positions are useful for clinical examination of subscapularis integrity but are contraindicated as strengthening exercises through Week 16. They may be reintroduced as light strengthening exercises in Phase 4 only after standard isotonic IR strengthening has been tolerated without anterior pain.

No Resisted Rotator Cuff Exercises Before Week 12

Tendon-to-bone healing at the lesser tuberosity is biologically incomplete before 12 weeks. Sharpey fibers binding tendon to bone appear in considerable numbers only after this window.⁶ Resisted RTC

strengthening — particularly internal rotation — before this point can compromise the repair and is one of the most common avoidable causes of repair failure. Scapular and periscapular strengthening can begin earlier (Phase 2), but isolated rotator cuff resistance is deferred to Week 12 regardless of patient strength or comfort.

Concomitant Biceps Procedure — Tenodesis vs Tenotomy

Most isolated subscapularis tears are accompanied by long head of the biceps pathology, and one of two procedures is performed in the same operation. **Tenodesis** fixes the biceps tendon to the humerus or pectoralis tendon; the fixation construct must be protected from active elbow flexion and resisted supination during early healing. **Tenotomy** releases the biceps tendon without fixation; there are no elbow flexion or supination restrictions and rehab proceeds without biceps-related limitations. Confirm the procedure from the operative report. If tenodesis was performed, the following restrictions apply within the standard subscapularis framework:

- No active elbow flexion × 3 weeks (AAROM permitted within sling)
- AROM elbow flexion against gravity from Week 3 onward, no resistance
- No resisted supination × 6 weeks
- Resisted elbow flexion deferred to Week 12 (light loads, progress slowly)
- Heavy biceps loading deferred to Week 16+

If tenotomy was performed, ignore the elbow flexion restrictions in the phase table — they are tenodesis-specific. Shoulder rehabilitation proceeds identically.

Pre-Operative Fatty Infiltration Predicts IR Strength Recovery

Higher-grade fatty degeneration of the subscapularis muscle belly preoperatively predicts persistent internal rotation weakness despite successful tendon repair. PTs encountering patients with significant pre-operative weakness should not interpret slower-than-expected IR strength recovery as protocol failure — recalibrate expectations and contact Dr. Roth's office if progress plateaus for more than 4 weeks. The repair will heal; the muscle's contractile capacity is a separate question.

Return-to-Activity Criteria

Return to activity after isolated subscapularis repair is criterion-based, with progression matched to the demands of the patient's target activity. The criteria below should be met before clearance to the corresponding activity tier. Per the Kennedy 2020 ASSET TSA consensus and Thigpen 2016 ASSET RTC consensus, full return to demanding activity typically occurs at ~6 months, with overhead athletic activity deferred further.^{1,2}

Activity Tier	Criteria & Timing
Activities of daily living (ADLs)	Full pain-free PROM, symptom-free AROM, hand-behind-back motion permitted. Typically by Week 12–16. Lifting up to 5 lbs at this point.
Light recreational (walking, golf, cycling, non-overhead swim)	Pain-free AROM, IR/ER isotonic strength approaching the contralateral side, no scapular compensation. Typically ~5–6 months.
Weight training, manual labor, basketball, skiing	IR strength LSI ≥ 90% on isokinetic or HHD testing, pain-free belly-press and bear-hug positions, no apprehension. Typically ~6 months.
Throwing sports, tennis, volleyball, overhead swim	Full strength symmetry, pain-free overhead motion, sport-specific drill progression complete. Typically ~8–12 months; throwing athletes at the longer end. Clearance by Dr. Roth required.

Activity Tier	Criteria & Timing
Strength & ROM benchmarks	IR strength LSI $\geq$ 90%; ER strength LSI $\geq$ 90%. Full pain-free AROM matching the contralateral side. No apprehension or pain with belly-press / bear-hug positions.

REALISTIC EXPECTATIONS FOR STRENGTH RECOVERY

Even with successful repair and rehab, IR strength frequently remains below pre-symptomatic levels at 6 months and continues to improve through 12–24 months post-op. Patients with significant pre-operative fatty infiltration of the subscapularis muscle belly may have persistent IR weakness despite anatomically successful repair. Patients should be counseled that ongoing strength gains beyond formal PT discharge are expected and that full functional recovery is a 12–18 month process. Persistent pain, weakness, or apprehension after 6 months should prompt re-evaluation by Dr. Roth.

References

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Glossary

AAOS — American Academy of Orthopaedic Surgeons.

AAROM — Active-assisted range of motion; the patient initiates motion with assistance from gravity, pulley, wand, or therapist.

ADL — Activities of daily living.

AROM — Active range of motion; the patient moves the joint independently against gravity.

ASSET — American Society of Shoulder and Elbow Therapists; published the 2016 consensus on RTC repair rehabilitation.

ER — External rotation.

HHD — Hand-held dynamometer; a portable device for objective strength measurement.

IR — Internal rotation.

LSI — Limb Symmetry Index; the operative limb's strength as a percentage of the contralateral limb (operative $\div$ contralateral $\times$ 100).

PER — Passive external rotation.

PFE — Passive forward elevation.

KEVIN M. ROTH, MD

ORTHOPAEDIC SPORTS MEDICINE

POD — Postoperative day.

PROM — Passive range of motion; the therapist or contralateral limb moves the joint while the patient stays relaxed.

RCT — Randomized controlled trial.

ROM — Range of motion.

RTC — Rotator cuff.



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Dr. Roth completed his orthopaedic surgery residency at Harvard Medical School and his sports medicine fellowship at the Kerlan-Jobe Orthopaedic Clinic in Los Angeles. In practice since 2013, he specializes in advanced arthroscopic techniques and sports medicine procedures, and sees patients at Palo Alto Medical Foundation's Palo Alto and Dublin offices. He welcomes calls from physical therapists about his patients or this protocol.

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