

PHYSICAL THERAPY PROTOCOL

Rotator Cuff Repair — Large to Massive Tear

Arthroscopic Repair (> 3 cm, Multiple Tendons, or Significant Retraction)

FOR THE PHYSICAL THERAPIST

Overview and Goals

This protocol governs rehabilitation following arthroscopic repair of large to massive rotator cuff tears — defined as tears greater than 3 cm of tendon involvement, multi-tendon tears (typically supraspinatus + infraspinatus, with or without subscapularis), or tears with significant retraction or fatty infiltration. The protocol is more conservative than the standard small-to-medium tear protocol because the biological challenge is greater: larger tears have higher retear rates, slower tendon-to-bone healing, and greater dependence on compensatory muscle activation patterns during functional recovery.^{1,2}

The framework is consistent with the 2016 ASSET consensus statement³ and the 2025 AAOS Clinical Practice Guideline on Rotator Cuff Injuries,¹ with size-specific modifications drawn from Burkhart 2019, Sgroi 2018, and the Kim 2019 functional recovery study.^{2,4,5} Compared to the small-to-medium tear protocol, large/massive repairs warrant: longer sling protection (6 weeks vs 4 weeks), delayed initiation of PROM (Week 2 vs POD 1), delayed AROM introduction (Week 12 vs Week 6), delayed strengthening (Week 16 vs Week 12), and a substantially longer overall recovery timeline (~11 months for strength activities, ~15 months for overhead sport, vs ~6 and ~8–12 months for smaller tears).⁵

Three principles guide rehabilitation. First, protect the repair through extended immobilization and deferred loading — tendon-to-bone healing in massive tears is unreliable before 12 weeks, and Sharpey fiber maturation continues through 16+ weeks.^{2,4} Second, permit gentle PROM beginning Week 2 to prevent stiffness while respecting the more vulnerable repair construct — the Mazuquin 2021 meta-analysis (n = 1,841, 20 RCTs) confirms that early gentle PROM does not increase retear risk even in larger tears.⁶ Third, incorporate anterior deltoid retraining as a foundational element in Phase 3+ — this is unique to large/massive tear rehabilitation and reflects the residual cuff deficiency that may persist even after successful repair.^{7,8}

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. Given the higher retear risk in this population, conservative bias is preferred over aggressive advancement.

READ BEFORE STARTING — CONCOMITANT PROCEDURE MODIFICATIONS

This protocol applies to large/massive tears of the supraspinatus and/or infraspinatus, with or without limited subscapularis involvement. Concomitant procedures require modifications applied **in addition to** the standard protocol below:

- If **subscapularis repair** was performed concomitantly, see the Subscapularis Repair Modification section.
- If a tear pattern is **predominantly subscapularis** (isolated subscap or subscap-dominant multi-tendon pattern), use Dr. Roth's dedicated Isolated Subscapularis Repair protocol instead.
- The Phase 1 elbow flexion guidance in the table below is conditional on whether **biceps tenodesis or biceps tenotomy** was performed (see Phase 1 cell). Patients with tenotomy have no elbow flexion restrictions.

- If **superior capsular reconstruction (SCR)** was performed, use Dr. Roth's dedicated Superior Capsular Reconstruction protocol instead — SCR rehabilitation differs meaningfully from rotator cuff repair.
- An **InSpace subacromial balloon spacer** or a **Regeneten Bioinductive Collagen Implant** does not modify this protocol — see the Augmentation & Spacer Procedures note below.
- If the tear was determined to be **irreparable** at the time of arthroscopy or was treated nonoperatively, use Dr. Roth's Massive Irreparable Rotator Cuff Tear — Nonoperative Treatment protocol instead.

Rehabilitation Phases

PHASE	SLING	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
PHASE 1 Weeks 0–6 <i>Repair protection & gentle passive motion</i>	• Sling with abduction pillow at all times for the full 6 weeks, including at night.^{1,3,9} • Remove only for prescribed PT, hygiene, and elbow/wrist/hand exercises. • Sling protection is extended compared to small/medium tear protocols given the higher retear risk in this population.	• No active shoulder elevation, abduction, or rotation. • No lifting, pushing, pulling, or reaching with the operative arm. • No support of body weight through the operative arm. If biceps tenodesis: • No active elbow flexion × 3 weeks (AAROM permitted within sling); resume AROM elbow flexion at Week 3. If biceps tenotomy: • No elbow flexion restrictions.	• Gentle PROM begins Week 2 within pain-free limits — slower progression than small/medium tear protocols.^{1,2} Weeks 0–2: • No PROM. Pendulum exercises only. Weeks 2–4: • Passive forward elevation in scapular plane progressing 0–90°. Passive ER at 0° abduction limited to 0°–20°. No PROM behind back. Weeks 4–6: • Passive forward elevation progressing to 120°. Passive ER progressing to 30°. Continue restriction on PROM behind back. Elbow / wrist / hand: • Full active ROM as tolerated (with biceps tenodesis modification noted above).	Pain & edema control: • Cryotherapy, NSAIDs per Dr. Roth's instructions, gentle scar mobilization once incisions healed Weeks 0–2 (immobilization): • Pendulum (Codman) — gentle, gravity-assisted • Cervical ROM, postural awareness • Scapular retraction and depression isometrics (no shoulder motion) • Distal extremity: elbow, wrist, hand AROM (with biceps tenodesis caveat); ball squeezes Weeks 2–6 (gentle PROM introduced): • Supine PROM forward elevation in scapular plane with therapist or contralateral-arm assistance • Supine PROM ER with broomstick / wand at 0° abduction within phase limits • Continue scapular sets / isometrics • Table slides (gentle, gravity-eliminated) introduced Week 4 Avoid: • Active shoulder motion of any kind • Resisted exercises • End-range PROM beyond phase limits • PROM behind the back • Sling-off ambulation in public spaces (fall risk; reflex arm-out reaction strains repair)	• Pain controlled at rest and with prescribed PROM • No effusion or inflammation around incision sites • PROM forward elevation ≥ 120° in scapular plane • PROM ER ≥ 30° at 0° abduction • Tolerates sling weaning at end of Week 6 • Minimum 6 weeks elapsed
PHASE 2 Weeks 6–12 <i>Sling weaning, PROM completion & AAROM introduction</i>	• Discontinue sling at end of Week 6.^{1,3} • May continue use for comfort during long days or crowded environment	• No AROM against gravity. • No resisted exercises. • No lifting more than coffee-cup weight. If biceps tenodesis: • Active elbow flexion now	• Progressive PROM toward full range.³ Forward elevation: • 120° → 160° ER at 0° abduction: • 30° → 45° ER at 90° abduction: • Introduce gradually starting Week 8, target 45° Internal rotation: • Hand to lumbar	PROM and AAROM: • Continue all Phase 1 PROM with progressive range • Pulley exercises for forward elevation • Wand-assisted ER and IR • Hand-behind-back motion introduced gradually starting Week 8 Scapular strengthening (low-load): • Scapular retraction with light resistance band • Shoulder shrugs (low load) • Postural strengthening	• Sling discontinued without arm guarding • Full or near-full pain-free PROM • Pain ≤ 2/10 with all prescribed exercises • Tolerates AAROM without compensatory scapular elevation

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PHASE	SLING	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
	ents through Week 8.	permitted (no resistance).	spine Cross-body adduction: - Progress slowly AAROM introduced (gravity-eliminated → minimal-gravity): - Pulley, table slides, wand-assisted forward elevation — smooth, scapular-controlled motion without compensation. No AROM against gravity until Phase 3.	- Prone scapular retraction (no shoulder elevation) Manual therapy: - Gentle joint mobilization (Grade I–II) and soft-tissue mobilization to scapular / periscapular musculature. Avoid aggressive glenohumeral mobilization at end-range given the higher retear risk in this population. Aquatic therapy: - Once incisions fully healed, pool-based PROM and AAROM offload the repair while supporting motion recovery	Minimum 12 weeks elapsed
PHASE 3 Weeks 12–18 <i>Active motion, scapular control & anterior deltoid retraining</i>	None.	- No resisted rotator cuff exercises until Week 16.^{2,4} - No lifting more than 2–3 lbs with the operative arm. - No overhead lifting or push/pull through resistance.	Full active ROM in all planes. Goal: full, symmetric, pain-free AROM by Week 18 (slower than small/medium tear protocols, which target Week 12).	AROM progression (gravity-eliminated → against gravity, Weeks 12–18): - Side-lying supported active elevation^{1,7} - Supine washcloth press-up, supine press-up - Reclined wedge press-up — progressive incline - Standing AROM forward elevation — initially no weight, progress to short lever (elbow bent) → long lever - Wall walks / wall slides - Towel slide on counter / horizontal dusting - Aquatic AROM at slow speeds Anterior deltoid retraining (foundational for large/massive tears): - Supine elastic-band forward elevation (very light, no rotator cuff resistance) — Levy 2008 program adapted - Progressive supine → inclined → upright forward elevation training - Smooth deltoid-driven elevation without scapular hike compensation - See Anterior Deltoid Retraining callout below for rationale and detailed progression Scapular & periscapular strengthening (intensified Phase 3): - Progressive scapular retraction / protraction with band - Rows (low load) - Prone Y, T, W (gravity only initially) - Wall push-up plus, serratus anterior punches - Lower / middle trapezius targeted exercises RTC isometrics introduced Week 16 (last weeks of Phase 3): - Submaximal isometrics in neutral: ER, IR, abduction, flexion - Continue PROM at full range to maintain motion gains	- Full or near-full pain-free AROM - No scapular hike with active forward elevation - Smooth scapulohumeral rhythm - Pain ≤ 1/10 with prescribed AROM and isometrics - Tolerates submaximal RTC isometrics without compensation - Minimum 18 weeks elapsed

PHASE	SLING	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
PHASE 4 Weeks 18–24+ <i>Strengthening & return to function</i>	None.	Resistance progresses gradually. Avoid aggressive overhead loading or sport-specific demands until appropriate criteria are met. Given the higher retear risk, conservative load progression is preferred.	Full pain-free AROM.	Rotator cuff isotonic progression (Weeks 18+): - Light theraband ER and IR at 0° abduction (yellow → red → green)^{2,3,4} - Side-lying dumbbell ER (start 1 lb, progress slowly) - Standing dumbbell ER in scapular plane - Elastic-band forward punch and forward elevation - Combined IR/ER patterns at 90° abduction (later phase) Scapular & periscapular strengthening (continued): - Progressive rows (high, middle, low) - Prone Y, T, W with light dumbbells - Reverse flys, scapular pull-downs - Push-up plus progressions Anterior deltoid strengthening (continued): - Progressive forward elevation with light load - Upright FE 1 lb → 3 lb progression Compound movements (later Phase 4, ≥ 8 months): - Seated military press (light load, late phase) - Lat pull-downs (front, not behind neck) - Bicep / tricep strengthening (with biceps tenodesis caveat) - Deltoid strengthening Functional: - Sport- or job-specific training at progressive intensity, deferred to ~9–12 months - Functional progression for manual labor, recreational, or athletic demands - Establish home maintenance program for ongoing strength and ROM gains beyond formal PT	<i>See Return-to-Activity Criteria section below.</i> Most patients return to weight training, golf, and recreation by ~11 months; throwing sports, tennis, and overhead athletics typically deferred to ~15 months.⁵

Procedure-Specific Considerations

Why This Protocol Is More Conservative Than Small/Medium Tear Protocols

Large/massive rotator cuff tears have inherently higher retear rates, slower tendon-to-bone healing, and reduced biomechanical fulcrum stability compared to small/medium tears.^{2,4} Recent meta-analyses (Mazuquin 2021, n = 1,841) demonstrate that early mobilization is safe in pooled rotator cuff repair populations, but the evidence base is weighted toward smaller tears.⁶ For large/massive repairs specifically, the literature supports a more conservative approach: 6-week sling immobilization (vs 4 weeks for smaller tears), delayed PROM initiation to Week 2 (with no PROM in the immediate post-op period), delayed AROM to Week 12 (vs Week 6), and delayed RTC strengthening to Week 16 (vs Week 12).^{1,3,9} This reflects the reality that the same biological window of vulnerability is present, but the repair construct is more fragile.

Anterior Deltoid Retraining — A Foundational Element for Large/Massive Tears

The anterior deltoid is a powerful elevator of the humerus and provides functional compensation when residual rotator cuff deficiency persists after large/massive repair. Levy 2008 demonstrated, in a cohort of elderly patients with massive irreparable cuff tears, that a structured anterior deltoid reeducation program improved forward elevation from a mean of 40° to 160° and Constant scores from 26 to 60.⁷ Although that study was in irreparable tears, the same principle applies post-repair: even after technically successful large/massive repair, residual cuff weakness frequently persists, and anterior deltoid training compensates by maintaining a stable glenohumeral fulcrum.⁸

Practical progression in Phase 3+:

- **Begin supine** — gravity is eliminated. Patient performs active forward elevation in scapular plane, holding for 5 seconds at 90°, then lowering slowly.
- **Progress to inclined** — bed at 30°, then 45°, then 60°. Same forward elevation pattern.
- **Progress to upright** — seated, then standing forward elevation. Initially no weight, then progressive light weight (1 lb, then 2 lb, then 3 lb).
- **Cue smooth deltoid-driven elevation without scapular hike** — scapular hike substitution is the single most common compensation pattern. Use mirror feedback or PT manual cueing.
- **Endurance focus** — 3 sets of 10–15 repetitions at low load, rather than fewer reps at higher load. The goal is sustained deltoid activation under functional demand.

Anterior deltoid training is layered alongside scapular and periscapular strengthening, not in place of it. The stable fulcrum requires both the deltoid (elevator) and the scapular stabilizers (anchor).

No Resisted Rotator Cuff Exercises Before Week 16

Tendon-to-bone healing in large/massive tears is biologically incomplete before 16 weeks — Sharpey fiber maturation is the rate-limiting step, and tear size is inversely correlated with healing rate.²⁴ Resisted RTC strengthening before this window can compromise the repair construct and is one of the most common avoidable causes of repair failure. This restriction applies regardless of how strong the patient feels or how good their ROM is. Scapular and periscapular strengthening can begin earlier (Phase 2–3), and anterior deltoid retraining is foundational starting Phase 3, but isolated rotator cuff resistance — internal rotation, external rotation, abduction with weight or band — is deferred to Week 16.

Scapular Mechanics Matter More Than Raw Strength

Large/massive tear patients commonly compensate with scapular hike (shoulder-shrug substitution) when active forward elevation is introduced — even more so than small/medium tear patients, because the residual cuff weakness is more pronounced. This compensation pattern is not benign; it indicates poor periscapular control and predicts higher rates of persistent dysfunction. Smooth, scapular-controlled motion without elevation compensation is a better marker of readiness to advance than raw degrees of motion. PTs should prioritize scapular awareness training and periscapular strengthening as foundational throughout Phases 2 and 3.³⁴

REALISTIC PATIENT COUNSELING — LARGE/MASSIVE TEARS HEAL SLOWLY

Patients should be counseled that the recovery timeline for large/massive tear repair is meaningfully longer than for smaller tears. Per the Kim 2019 cohort study, patients with large/massive tears returned to lifting 5 kg at a mean of 11 months (vs 10 months for smaller tears) and to sport at a mean of 15 months (vs 13 months).⁶ This is not a sign of slow rehabilitation — it is the expected biology of large-tear repair. Patients who are pushed faster than this timeline are at higher risk of repair failure. Setting realistic expectations early prevents the patient frustration that can lead to noncompliance or premature return to demanding activity.

Subscapularis Repair Modification

If concomitant subscapularis repair was performed (e.g., as part of a four-tendon involvement pattern, or with a tear extending into the upper subscapularis), the modifications below apply **in addition to** the standard protocol above. If the tear was predominantly subscapularis (isolated subscap or subscap-dominant), use Dr. Roth's Isolated Subscapularis Repair protocol instead of this protocol.

CONCOMITANT SUBSCAPULARIS REPAIR — READ BEFORE STARTING

Sling: No change — 6 weeks per standard protocol.

External rotation restriction (tighter limit, longer duration):

- Passive ER limited to $\leq 30^\circ$ in scapular plane $\times$ 6 weeks (per Kennedy 2020 ASSET TSA consensus)
- No PER behind the back $\times$ 6 weeks
- No PER at 90° abduction until Week 8
- From Week 8 onward: progress ER gradually, monitoring for anterior shoulder pain that suggests excessive subscapularis strain

Active internal rotation strengthening: Defer until Week 16 (consistent with the standard RTC resistance window for large/massive tears). Hand-to-belt-line PROM is permitted at Week 6 with caution.

Internal rotation strengthening: When introduced at Week 16, begin with isometric IR in neutral, progress to light theraband IR before adding load. Avoid belly-press and bear-hug positions through Week 20.

RTS timeline: Standard large/massive timeline applies. No accelerated return.

Augmentation & Spacer Procedures

Two augmentation procedures are increasingly performed alongside large/massive rotator cuff repair. Neither modifies this protocol; rehabilitation is governed by the underlying tear and repair, not by the implant or spacer.

INSPACE BALLOON SPACER & REGENETEN IMPLANT — NO MODIFICATION

InSpace subacromial balloon spacer: In the typical scenario — a balloon spacer placed alongside a concomitant supraspinatus and/or subscapularis repair — follow this protocol unchanged. The balloon neither adds restrictions nor permits accelerated progression; the repair is still the structure being protected. (Isolated balloon placement without any repair is uncommon and follows a subacromial decompression pathway rather than this protocol.)

Regeneten Bioinductive Collagen Implant: Does not modify rehabilitation. A large or massive repair augmented with the implant follows this protocol; a small or partial-thickness repair augmented with it follows Dr. Roth's Rotator Cuff Repair — Small to Medium Tear protocol. Sling duration, ROM progression, and strengthening timelines are governed by the underlying tear and repair, not by the implant.

Return-to-Activity Criteria

Return to activity after large/massive rotator cuff 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. Timelines reflect the Kim 2019 cohort study of post-repair functional recovery, which demonstrated meaningfully delayed return compared to small/medium tear repair.⁶

Activity Tier	Criteria & Timing
Activities of daily living (ADLs)	Full pain-free PROM and symptom-free AROM. Typically achieved by Week 18–22. Lifting up to 5 lbs at this point.
Light recreational (walking, golf, cycling, non-overhead swim)	Pain-free AROM, RTC isotonic strength symmetry building, no scapular compensation. Typically ~9 months.
Weight training, manual labor, basketball, skiing	RTC strength symmetry approaching 80% on isokinetic or HHD testing, pain-free overhead motion, no apprehension, smooth deltoid-driven elevation without scapular compensation. Typically ~11 months.
Throwing sports, tennis, volleyball, overhead swim	Full strength symmetry (LSI $\geq$ 90%), pain-free overhead motion, sport-specific drill progression complete. Typically ~15 months; throwing athletes may require longer. Clearance by Dr. Roth required.
Strength & ROM benchmarks	RTC strength LSI $\geq$ 90% on isokinetic or HHD. Full pain-free AROM matching the contralateral side. Smooth scapulohumeral rhythm. No apprehension or pain with overhead positions.

REALISTIC EXPECTATIONS FOR STRENGTH RECOVERY

Patients with large/massive tear repairs frequently experience incomplete strength recovery compared to pre-symptomatic levels — even with successful repair and complete rehabilitation. Strength continues to improve through 12–24 months post-op, but a degree of residual weakness is common, particularly in patients with significant pre-operative fatty infiltration or chronicity. Patients should be counseled that the goal is functional capacity for their target activities, not necessarily restoration of pre-injury strength. Persistent pain, weakness, or apprehension after 12 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.

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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 ($\text{operative} \div \text{contralateral} \times 100$).

PER — Passive external rotation.

PFE — Passive forward elevation.

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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