

PHYSICAL THERAPY PROTOCOL

Elbow UCL Reconstruction

Tommy John Surgery · Adult & Adolescent Throwers

FOR THE PHYSICAL THERAPIST

Overview and Goals

This protocol governs rehabilitation following reconstruction of the ulnar collateral ligament (UCL) of the elbow with a tendon graft — Tommy John surgery. The anterior band of the UCL is the primary restraint to valgus stress at the elbow, and the forces generated during overhead throwing repeatedly load it near its failure threshold. Reconstruction replaces the incompetent ligament with a tendon graft that must undergo a prolonged biological maturation process — revascularization, cellular repopulation, and collagen remodeling — before it can tolerate throwing loads.^{1,2}

Graft maturation — not strength recovery — is the rate-limiting step of this rehabilitation. Most athletes feel strong and normal months before the graft is biologically ready to throw. The phase structure below protects the graft through that window: progressive ROM in a hinged brace through week 6, progressive strengthening without valgus stress through week 16, and a criterion-gated interval throwing program beginning at week 16. Full return to competition typically takes 12–16 months; professional pitchers may require up to 18.^{1,3,4,8}

NO THROWING OF ANY KIND UNTIL THE INTERVAL THROWING PROGRAM BEGINS

This includes informal catch, long toss, and bullpen sessions. Even light tossing before week 16 loads a graft that is biologically immature and risks graft failure. The interval throwing program is initiated only when the criteria at the end of Phase 4 are met and Dr. Roth, his PA or his NP has cleared the athlete.

THIS PROTOCOL IS FOR RECONSTRUCTION — NOT REPAIR

Patients who underwent **UCL repair with internal brace augmentation** follow the separate, accelerated **KMR UCL Repair** protocol. The operative report specifies which procedure was performed. Contact Dr. Roth's office if uncertain.

A concomitant ulnar nerve transposition is commonly performed during UCL reconstruction. If the operative report documents a transposition, monitor sensory symptoms in the ring and small fingers throughout the early phases — transient paresthesias are common and typically resolve, but progressive or persistent symptoms warrant communication with Dr. Roth, his PA or his NP.

Rehabilitation Phases

PHASE	BRACE	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
PHASE 1 Weeks 0–3 <i>Immediate post-op protection</i>	- Posterior splint at 90° for week 1. Removed at the first post-op visit. - Hinged elbow brace from week 1, set 30–100°. ^{1,2}	- No valgus stress to the elbow — in exercise or daily activity. - No resisted shoulder internal rotation. - No resisted wrist flexion or forearm	Goals by end of Phase 1: - Extension to 15° - Flexion to 110° - Full wrist and hand ROM from day 1	Swelling / pain control: - Cryotherapy, elevation, compression Hand / wrist (immediate): - Gripping exercises (putty, ball squeezes) - Wrist AROM — flexion, extension (unresisted) - Finger ROM Elbow / shoulder: - Elbow AROM within brace limits - Submaximal elbow flexion /	- Pain controlled - Incisions healed - ROM 15–110° - No progressive ulnar nerve symptoms - Minimum 3 weeks elapsed

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PHASE	BRACE	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
		- pronation (protects the flexor-pronator repair). - No passive overpressure into terminal extension. - No weight bearing through the operative arm — no pushing up from chairs, planks, or leaning on the arm — for 6 weeks.¹⁰		- extension isometrics - Shoulder isometrics — no resisted internal rotation; avoid positions that load the elbow in valgus - Scapular sets: retraction, depression Conditioning: - Walking, stationary bike (upright, no arm loading)	
PHASE 2 Weeks 4–6 <i>Progressive ROM & early strengthening</i>	- Advance brace 5–10° per week toward full ROM.^{1,2} - Discontinue brace at week 6 once full ROM achieved.	- No valgus stress. - No weight bearing through the operative arm (through week 6). - Resisted wrist flexion and pronation may begin gently at week 5–6.	- Full elbow ROM (0–145°) by week 6. - Full forearm pronation / supination.	Light isotonic strengthening (begin week 4): - Wrist curls, wrist extension (1 lb, progressive) - Forearm pronation / supination - Biceps curls, triceps extension (light) Shoulder / scapula: - Isotonic program avoiding valgus positions - Side-lying external rotation, prone rows, prone horizontal abduction - Scapular strengthening: serratus punches, low rows Conditioning: - Core and lower-extremity program begins — squats, lunges, hip strengthening (the kinetic chain generates most throwing velocity)	- Full elbow ROM (0–145°) - No pain or tenderness - Brace discontinued - Minimum 6 weeks elapsed
PHASE 3 Weeks 6–12 <i>Progressive strengthening</i>	None.	- No valgus stress. - No throwing motions of any kind.	Maintain full, pain-free ROM throughout.	Thrower's Ten program: - Full program — rotator cuff, scapular, and forearm strengthening with progressive resistance.⁵ Elbow / forearm: - Progressive wrist and forearm resistance - Eccentric elbow flexion / extension Shoulder: - Progressive rotator cuff loading — maintain total arc of motion; address GIRD with sleeper and cross-body stretches as indicated Kinetic chain: - Progressive core, hip, and leg strengthening - Rotational core work (medicine ball — no throwing release) Endurance: - High-repetition, low-load endurance sets for the flexor-pronator group	- Full, pain-free ROM - Strength ≥ 70% contralateral (shoulder ER/IR, grip) - No pain with resisted wrist flexion / pronation - Minimum 12 weeks elapsed
PHASE 4 Weeks 12–16 <i>Advanced</i>	None.	No throwing until ITP criteria met and clearance	Full, pain-free ROM.	Advanced Thrower's Ten: Sustained-hold and endurance variants; continue full program.⁵ Plyometrics — two-handed (begin	- Full, pain-free ROM - Shoulder ER/IR and grip strength

PHASE	BRACE	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
<i>strengthening & plyometrics</i>		given.		week 12): - Chest pass, side-to-side throws, overhead soccer throws (medicine ball) Plyometrics — one-handed (begin week 14): 90/90 wall dribbles, one-hand baseball throws into plyoback, deceleration catches^{1,5} Kinetic chain: - Rotational power development — med-ball scoop toss, lateral bounds Grip / forearm: - Rice bucket program, heavy grip work	≥ 90% contralateral - No pain with valgus stress testing on clinical exam¹ - One-hand plyometric program completed without symptoms - Clearance by Dr. Roth, his PA or his NP - Minimum 16 weeks elapsed
PHASE 5 Week 16+ <i>Return to throwing</i>	None.	- Throw only on scheduled ITP days — no unscheduled throwing. - Stop immediately for medial elbow pain — soreness rules govern progression.	Full, pain-free ROM maintained.	Interval throwing program (begins week 16): - Follow the KMR Return to Throwing Protocol — flat-ground long-toss phases progressing by distance and volume, each stage repeated until asymptomatic.⁶ Mound progression (pitchers): - Begins after completion of the flat-ground long-toss phases — typically months 6–9 — per the Return to Throwing Protocol and clearance by Dr. Roth, his PA or his NP.⁶ Maintenance (throughout): - Continue Thrower's Ten and kinetic-chain program for the entire return-to-throwing period — detraining during the ITP is a common cause of setbacks	- Completion of ITP stages without symptoms - Competitive throwing clearance by Dr. Roth - Full competitive return: 12–16 months; professional pitchers may require up to 18. Position players typically return earlier^{3,4,8}

Procedure-Specific Considerations

Graft Maturation — Why the Timeline Cannot Be Compressed

The tendon graft undergoes necrosis, revascularization, and ligamentization over 9–12+ months. Its mechanical strength follows a U-shaped curve: the graft is weakest months after surgery, when the athlete feels essentially normal. This mismatch between how the arm feels and what the graft tolerates is the central hazard of Tommy John rehabilitation, and the reason both time gates and criterion gates must be satisfied before each throwing progression.^{1,2,3}

Ulnar Nerve Considerations

When an ulnar nerve transposition accompanies the reconstruction, transient paresthesias in the ring and small fingers are common in the first several weeks and usually resolve. Document sensory status at each visit. Progressive motor weakness (intrinsic hand weakness, grip decline out of proportion to expected post-op weakness) or worsening sensory loss warrants prompt communication with Dr. Roth, his PA or his NP. Nerve glides may be introduced if adherence-type symptoms develop, at the therapist's discretion.

Flexor-Pronator Protection

The surgical approach involves the flexor-pronator mass, and any repair of that musculature is protected early: resisted wrist flexion and forearm pronation are deferred until weeks 5–6 and then loaded progressively. The flexor-pronator group is also the dynamic stabilizer that shares valgus

load with the graft during throwing — its endurance, not just its peak strength, is a specific target of Phases 3–4.^{1,5}

Valgus Stress in Daily Life

Valgus load is not limited to exercise. Instruct the athlete to avoid activities that lever the forearm into valgus during the first 12 weeks — pulling doors open with the arm extended, carrying heavy loads away from the body, leaning on an outstretched arm. These low-grade repetitive loads are easy to overlook and cumulatively meaningful.

The Kinetic Chain Is the Engine

More than half of throwing velocity is generated by the legs and trunk. Deficits in hip rotation, single-leg stability, and trunk rotational power funnel load distally to the elbow. The lower-extremity and core program that begins in Phase 2 is not optional conditioning — it is elbow protection. Shoulder motion must also be maintained: loss of total arc of motion and GIRD are established risk factors for medial elbow overload.^{5,7}

Adolescent Throwers

This protocol is universal for adult and adolescent athletes, with adolescent-specific emphasis in four areas.¹¹

- **Mechanics before throwing.** Adolescent UCL injuries are strongly associated with poor throwing mechanics, core and lower-extremity deficits, excessive pitch counts, and year-round play. A formal biomechanical throwing analysis — with correction of identified kinetic-chain deficits — should be completed before the interval throwing program begins.¹¹
- **Target the later end of the ITP window.** Adolescents should initiate the throwing program at weeks 16–18 rather than pushing the front edge, and should target the 12–16 month return-to-competition window with strict adherence to age-appropriate pitch counts, limits on simultaneous teams, and off-season rest on return.¹¹
- **Screen for capitellar OCD.** Concomitant intra-articular pathology — particularly osteochondritis dissecans of the capitellum — was associated with the only poor outcomes in a published adolescent UCLR series; patients with such lesions should be counseled about potentially inferior outcomes.¹¹
- **Favorable outlook.** Roughly 84% of adolescents return to the same or higher level of play, and younger patients recover ROM more reliably than older ones — the conservative timeline protects a long career, not a fragile one.¹¹

Return-to-Sport Criteria

Return to competitive throwing after UCL reconstruction is high — 80–90%+ across published cohorts — but slow, with return to competition at a mean of 12.2 months and professional pitchers often requiring 15–18 months.^{3,4,8} All criteria below must be met before competitive clearance.

Domain	Criterion
Range of motion	Full, pain-free elbow ROM (0–145°); full forearm rotation; shoulder total arc symmetric to contralateral side. ⁵
Clinical exam	No medial elbow tenderness; no pain with valgus stress testing.
Strength	Shoulder ER/IR and grip strength ≥ 90% contralateral; flexor-pronator endurance restored. ^{1,5}
Throwing program	Full interval throwing program and mound progression (pitchers)

Domain	Criterion
	completed without symptoms, per the KMR Return to Throwing Protocol [®]
Patient-reported	KJOC score $\geq$ 90 supports readiness in competitive throwers [®]
Time	12–16 months typical; professional pitchers may require up to 18. Position players: typically 9–12 months. Time gates are minimums, not targets ^{2,4,8}
Clearance	Final competitive clearance by Dr. Roth

THE ARM FEELS READY LONG BEFORE THE GRAFT IS

By month 5 or 6, most athletes have full motion, normal strength, and no pain — and a graft that is at or near its weakest point of biological remodeling. The athletes who re-tear are disproportionately the ones who compress the throwing progression because the arm “felt great.” Hold the timeline. The interval throwing program’s pace is the treatment, not an obstacle to it.

References

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Glossary

AROM / PROM — Active / passive range of motion.

ER / IR — External rotation / internal rotation (of the shoulder).

GIRD — Glenohumeral internal rotation deficit; loss of shoulder internal rotation relative to the contralateral side, a risk factor for medial elbow overload in throwers.

ITP — Interval throwing program; the structured, distance- and volume-graded flat-ground throwing progression detailed in the KMR Return to Throwing Protocol.

KJOC — Kerlan-Jobe Orthopaedic Clinic Shoulder & Elbow score; a patient-reported outcome measure specific to overhead athletes.

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Thrower's Ten — A standardized exercise program targeting the rotator cuff, scapular stabilizers, and forearm musculature of the throwing athlete.

UCL — Ulnar collateral ligament of the elbow; its anterior band is the primary restraint to valgus stress.

Valgus stress — Force that angles the forearm away from the midline at the elbow — the loading pattern of the late-cocking and acceleration phases of throwing.



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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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