KEVIN M. ROTH, MD
ORTHOPAEDIC SPORTS MEDICINE

PHYSICAL THERAPY PROTOCOL

Elbow UCL Repair with Internal Brace

Suture Tape Augmentation · Adult & Adolescent Throwers

FOR THE PHYSICAL THERAPIST

Overview and Goals

This protocol governs rehabilitation following primary repair of the ulnar collateral ligament with internal brace augmentation — a collagen-dipped suture tape spanning the repair. The procedure is indicated for complete or partial UCL avulsions from the sublime tubercle or medial epicondyle with healthy ligament midsubstance; the repair-versus-reconstruction decision is confirmed intraoperatively based on tissue quality.[1,4]

The rehabilitation logic differs fundamentally from reconstruction. There is no tendon graft undergoing months of biological maturation — the native ligament heals while the internal brace provides immediate mechanical stability, reducing gap formation and increasing construct stiffness from day one. This permits an accelerated timeline throughout: full ROM by week 4 (versus week 6), interval throwing at week 12 (versus 16), mound work at months 4–6 (versus 6–9), and return to competition at approximately 8–9 months (versus 12–16). Published outcomes are excellent: 93–98% return to sport, with revision rates (≈9%) no different from reconstruction.[1,2,3,4]

ACCELERATED DOES NOT MEAN UNPROTECTED

The internal brace stabilizes the repair — it does not make the healing ligament throw-ready. Every progression in this protocol remains criterion-gated. No throwing of any kind — including informal catch — until the interval throwing program is initiated with clearance from Dr. Roth, his PA or his NP.

THIS PROTOCOL IS FOR REPAIR — NOT RECONSTRUCTION

Patients who underwent **UCL reconstruction with a tendon graft** (Tommy John surgery) follow the separate **KMR UCL Reconstruction** protocol with its longer graft-maturation timeline. The operative report specifies which procedure was performed. Contact Dr. Roth's office if uncertain.

Rehabilitation Phases

PHASE	BRACE	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
PHASE 1 Weeks 0–2 *Immediate post-op protection*	• Posterior splint at 90° for the first 5–7 days. • Hinged elbow brace from ~week 1, set 30–100°.[3]	• No valgus stress to the elbow — in exercise or daily activity. • No resisted shoulder internal rotation. • No resisted wrist flexion or forearm pronation. • No weight bearing through the operative arm.	**Goals by end of Phase 1:** • Motion within the 30–100° brace arc • Full wrist and hand ROM from day 1	**Swelling / pain control:** • Cryotherapy, elevation, compression **Hand / wrist (immediate):** • Gripping exercises (putty, ball squeezes) • Wrist AROM (unresisted) • Finger ROM **Elbow / shoulder:** • Submaximal elbow flexion / extension isometrics — these do not strain the repair.[3] • Shoulder isometrics — no resisted internal rotation; avoid valgus-loading positions • Scapular sets: retraction, depression **Conditioning:**	• Pain controlled • Incisions healed • Comfortable in brace arc • No progressive ulnar nerve symptoms • Minimum 2 weeks elapsed

PHASE	BRACE	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
				• Walking, stationary bike (upright, no arm loading)	
PHASE 2 Weeks 2–4 *Progressive ROM*	• Advance brace 10° of extension and 10° of flexion per week.[3,6] • Discontinue brace at week 4 once full ROM achieved.	• No valgus stress. • No weight bearing through the operative arm.	• Full elbow ROM (0–145°) by week 4 — approximately 2 weeks earlier than reconstruction.[3,6] • Full forearm pronation / supination.	**ROM:** • Active-assisted and active elbow flexion / extension within advancing brace limits **Light isotonic strengthening:** • Biceps curls, triceps extension (light) • Wrist curls and extension (1 lb, progressive) **Shoulder / scapula:** • Isotonic program avoiding valgus positions • Scapular stabilization: serratus punches, low rows **Conditioning:** • Core and lower-extremity program begins — the kinetic chain generates most throwing velocity	• Full elbow ROM (0–145°) • No pain or tenderness • Brace discontinued • Minimum 4 weeks elapsed
PHASE 3 Weeks 4–8 *Progressive strengthening*	• None.	• No valgus stress. • No throwing motions of any kind. • Resisted wrist flexion and pronation begin gently at week 4–5, progressive thereafter.	• Maintain full, pain-free ROM throughout.	**Thrower's Ten program:** • Full program — rotator cuff, scapular, and forearm strengthening with progressive resistance.[3,5] **Elbow / forearm:** • Progressive isotonic wrist and forearm resistance • Eccentric strengthening of the flexor-pronator mass **Shoulder:** • Progressive rotator cuff loading; maintain total arc of motion; address GIRD as indicated **Plyometrics — two-handed (begin week 6):** • Chest pass, side-to-side throws (medicine ball) **Kinetic chain:** • Progressive core, hip, and leg strengthening; upper body ergometer	• Full, pain-free ROM • Strength ≥ 70% contralateral (shoulder ER/IR, grip) • No pain with resisted wrist flexion / pronation • Minimum 8 weeks elapsed
PHASE 4 Weeks 8–12 *Advanced strengthening & plyometrics*	• None.	• No throwing until ITP criteria met and clearance given.	• Full, pain-free ROM.	**Advanced Thrower's Ten:** • Sustained-hold and endurance variants; continue full program **Plyometrics — one-handed:** • 90/90 wall dribbles, one-hand throws into plyoback, deceleration catches, weighted-ball drills.[3] **Kinetic chain:** • Rotational power development — med-ball scoop toss, lateral bounds **Grip / forearm:** • Rice bucket program, heavy grip work	• Full, pain-free ROM • Shoulder ER/IR and grip strength ≥ 90% contralateral • No pain with valgus stress testing on clinical exam[1] • One-hand plyometric program completed without symptoms • Clearance by Dr. Roth, his PA or his NP • Minimum 12 weeks elapsed
PHASE 5	• None.	• Throw only on	• Full, pain-	**Interval throwing program (begins**	• Completion of ITP

PHASE	BRACE	RESTRICTIONS	ROM GOALS	EXERCISES	CRITERIA TO ADVANCE
Week 12+ *Return to throwing*		scheduled ITP days — no unscheduled throwing. • Stop immediately for medial elbow pain — soreness rules govern progression.	free ROM maintained.	**week 12):** • Follow the KMR Return to Throwing Protocol — flat-ground long-toss phases progressing by distance and volume, each stage repeated until asymptomatic.[7] • Adolescent throwers target week 14 rather than the front edge of the window.[9] **Mound progression (pitchers):** • Begins after completion of the flat-ground long-toss phases — typically months 4–6 — per the Return to Throwing Protocol and clearance by Dr. Roth, his PA or his NP.[1,3] **Maintenance (throughout):** • Continue Thrower's Ten and kinetic-chain program for the entire return-to-throwing period	stages without symptoms • Competitive throwing clearance by Dr. Roth • Return to practice ≈ 6–7 months; return to competition ≈ 8–9 months[1,2]

Procedure-Specific Considerations

Why Repair Rehabilitates Faster Than Reconstruction

In reconstruction, a tendon graft must revascularize and remodel over 9–12+ months before tolerating throwing loads. In repair, the athlete's own ligament heals — typically an avulsion reattached to bone — while the internal brace shares load from the moment of fixation. Comparative data reflect this: return to practice at a mean of 6.7 months (versus 10.2 for reconstruction) and return to competition at 9.2 months (versus 13.4), with equivalent return-to-sport rates and no difference in revision rates.[1,2]

Patient Selection Context

Repair and reconstruction serve different injury patterns — avulsion-type tears with healthy midsubstance versus midsubstance tears or degenerative tissue. The published timeline differences therefore reflect different populations, not a head-to-head comparison of the same injury. If intraoperative findings converted a planned repair to reconstruction, the reconstruction protocol governs; verify against the operative report.[1,4]

Ulnar Nerve Considerations

Repair carries lower rates of post-operative ulnar neuritis than reconstruction, but transient paresthesias in the ring and small fingers can still occur, particularly when a transposition was performed. Document sensory status at each visit; progressive motor weakness or worsening sensory loss warrants prompt communication with Dr. Roth, his PA or his NP.[2]

Valgus Stress in Daily Life

Instruct the athlete to avoid activities that lever the forearm into valgus during the first 8 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 cumulatively meaningful during ligament healing.

The Kinetic Chain Is the Engine

More than half of throwing velocity is generated by the legs and trunk. The lower-extremity and core program beginning in Phase 2 is elbow protection, not optional conditioning. Maintain shoulder total arc of motion and address GIRD throughout — both are established contributors to medial elbow overload.[5]

Adolescent Throwers

This protocol is universal for adult and adolescent athletes, with adolescent-specific emphasis in four areas.[9]

- **Skeletal maturity matters.** Repair with internal brace requires adequate bone quality for anchor fixation; in skeletally immature patients with an open medial epicondyle apophysis, fracture fixation rather than ligament repair may have been performed — verify the operative report, as that follows a different course.[9]
- **Target the later end of each phase.** Adolescents initiate the throwing program at week 14 rather than week 12, and should target the later end of every phase window to protect long-term career longevity.[9]
- **Mechanics before throwing.** Formal biomechanical throwing analysis and correction of kinetic-chain deficits should precede the ITP. Adolescent UCL injuries are strongly associated with poor mechanics, excessive pitch counts, and year-round play; workload discipline on return — pitch counts, one team at a time, scheduled rest — is essential.[9]
- **Counsel on complications.** Repair carried a higher overall complication rate than reconstruction in one series (10% vs. 3%), though with less ulnar neuritis; families should understand both sides of the accelerated-timeline trade.[2]

Return-to-Sport Criteria

Published return-to-sport rates after repair with internal brace are 93–98%, with return to practice at a mean of 6.7 months and competition at 8–9 months.[1,2,4] All criteria below must be met before competitive clearance — the accelerated timeline makes criterion discipline more important, not less.

Domain	Criterion
Range of motion	Full, pain-free elbow ROM (0–145°); full forearm rotation; shoulder total arc symmetric to contralateral side[3,5]
Clinical exam	No medial elbow tenderness; no pain with valgus stress testing[1]
Strength	Shoulder ER/IR and grip strength ≥ 90% contralateral; flexor-pronator endurance restored[3,5]
Throwing program	Full interval throwing program and mound progression (pitchers) completed without symptoms, per the KMR Return to Throwing Protocol[7]
Patient-reported	KJOC score ≥ 90 supports readiness in competitive throwers[5]
Time	Return to practice ≈ 6–7 months; competition ≈ 8–9 months. Adolescents target the later end. Time gates are minimums, not targets[1,2,9]
Clearance	Final competitive clearance by Dr. Roth

THE INTERNAL BRACE IS A SEATBELT, NOT AN ENGINE

The suture tape protects the healing ligament from catastrophic loading — it does not accelerate biology, restore proprioception, or rebuild the flexor-pronator endurance that shares valgus load during a season of throwing. Athletes who treat the hardware as permission to skip criteria trade a faster return for a higher re-injury risk. The timeline is faster because the biology allows it; the criteria are unchanged because throwing does not care what stabilized the elbow.

References

1. Dugas JR, Froom RJ, Mussell EA, et al. Clinical Outcomes of Ulnar Collateral Ligament Repair With Internal Brace Versus Ulnar Collateral Ligament Reconstruction in Competitive Athletes. Am J Sports Med. 2025;53(3):525–536.
2. Kirkham MS, Alvandi BA, Christy KB, et al. Return to Sport After Ulnar Collateral Ligament Repair and Reconstruction. J Shoulder Elbow Surg. 2026.
3. Wilk KE, Arrigo CA, Bagwell MS, Rothermich MA, Dugas JR. Repair of the Ulnar Collateral Ligament of the Elbow: Rehabilitation Following Internal Brace Surgery. J Orthop Sports Phys Ther. 2019;49(4):253–261.
4. Dugas JR, Looze CA, Capogna B, et al. Ulnar Collateral Ligament Repair With Collagen-Dipped FiberTape Augmentation in Overhead-Throwing Athletes. Am J Sports Med. 2019;47(5):1096–1102.
5. Wilk KE, Meister K, Andrews JR. Current Concepts in the Rehabilitation of the Overhead Throwing Athlete. Am J Sports Med. 2002;30(1):136–151.
6. Buchanan TR, Hones KM, Hao KA, et al. Rehabilitation Protocols in Elbow Medial Ulnar Collateral Ligament Injuries: A Systematic Review of Articles Published in the Last 20 Years. Sports Health. 2025;17(3):460–469.
7. Reinold MM, Wilk KE, Reed J, Crenshaw K, Andrews JR. Interval Sport Programs: Guidelines for Baseball, Tennis, and Golf. J Orthop Sports Phys Ther. 2002;32(6):293–298.
8. Morrissette C, Alexander F, Mastroianni M, et al. Elbow Range of Motion Is Stable or Improves Following Ulnar Collateral Ligament Repairs and Reconstructions. J Shoulder Elbow Surg. 2026;35(5):1309–1317.
9. Putukian M, Leclere LE, Herring SA, et al. The Adolescent Athlete and the Team Physician: A Consensus Statement. 2025 Update. Med Sci Sports Exerc. 2026;58(2):371–402.

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.

Internal brace — A collagen-coated high-strength suture tape anchored across the repaired ligament, providing immediate mechanical stability while the native ligament heals.

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.

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.

Kevin M. Roth, MD

Board-Certified Orthopaedic Surgeon · Subspecialty Certification in Sports Medicine

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.

Palo Alto Medical Foundation · Sutter Health · KevinRothMD.com