

ULNAR COLLATERAL LIGAMENT REPAIR WITH AUGMENTATION REHABILITATION PROTOCOL

	RANGE OF MOTION	IMMOBILIZER	EXERCISES
PHASE I 0-6 weeks	0-1 weeks: None 2 weeks: elbow 30-110° 3 weeks: elbow 10-125° 4 weeks: elbow 0-145°	0-1 weeks: splint 2 weeks: brace 30-110° 3 weeks: brace 10-125° 4 weeks: brace 0-145°	0-1 weeks: wrist motion and hand motion 2 weeks: active ROM shoulder, scapular isometrics 3 weeks: Elbow AROM progress to 10-125° Begin wall squats, lateral slide, single leg squats, leg press (no use of operative arm) hip and core exercise (no use of operative arm). 4-6 weeks: Progress AROM and restore full ROM, Initiate wrist flexion and elbow flexion movements against resistance Start Throwers Ten Program (by ASMI below)
Before Phase II: must have 0-145°, minimal pain, good manual muscle testing of: elbow flexion/extension; wrist flexion; shoulder internal and external rotation, scapular abduction			
PHASE II 6-8 weeks	Progress to full ROM	Discontinue Brace at 6 weeks	Starting Week 6: <ul style="list-style-type: none"> • Initiate Advanced Throwers Ten program • Initiate 2-hand plyometrics: chest pass, side-to-side throw, and overhead pass • Initiate prone plank exercise Starting Week 8: <ul style="list-style-type: none"> • Progress to 1-hand plyometrics: 90°/90° ball throw, 0° ball throw • Continue with Advanced Throwers Ten program • Initiate side plank with shoulder ER strengthening exercise No aggressive weight lifting until 12 weeks post operatively No chest flies or lifts stressing ligament Avoid any valgus stress on elbow until minimum 2 months post operatively
Before Phase III: Must have full, nonpainful elbow AROM, no pain or tenderness, minimum 70% strength in shoulder and elbow compared to opposite side, appropriate clinical examination, completion of Phase II exercises without difficulty or pain.			

<p>PHASE III 9-14 weeks</p>	<p>Week 9: Continue all strengthening exercises, Advanced Throwers Ten program, plyometrics</p> <p>Week 10:</p> <ul style="list-style-type: none"> • Seated chest-press machine • Seated row machine • Biceps/triceps machine or cable strengthening • Interval hitting program <p>Week 12 (if meets Criteria for Starting Interval Throwing): Begin interval throwing program progressing from 45ft to 90 ft. Distance level may be increased ONLY when:</p> <ul style="list-style-type: none"> • No pain or stiffness while throwing • No pain or stiffness after throwing • Strength is maintained and fatigue is minimal after completion of final set • Throwing motion is effortless with appropriate mechanics • Accuracy and throwing lines are consistent
<p>To advance to Phase IV: must have full elbow, wrist, and shoulder ROM; no pain or tenderness; functional or isokinetic test that fulfills criteria for goal activity; appropriate clinical examination, completion of Phase III exercises without difficulty</p>	
<p>PHASE IV 14+ weeks</p>	<p>Weeks 14 – 16:</p> <ul style="list-style-type: none"> • Continue Phase III exercises • Continue and progress interval throwing program. • Athletes may progress through ITP at different rates/paces • Expected to complete throws of 0 to 27 m (0-90 ft) within 3 weeks of starting ITP and throws of 0 to 37 m (120 ft) within 8 weeks <p>Weeks 16 to 20</p> <ul style="list-style-type: none"> • Continue ROM and stretching programs • Continue Advanced Throwers Ten program • Continue plyometrics • Initiate ITP phase 2 (off the mound) when phase 1 is complete and athlete is ready • Pitchers may begin mound throwing after completing 120 ft distance. NO flat ground pitching. Start with catcher moved forward when throwing from the mound and progress to full distance. <p>Weeks 20+</p> <ul style="list-style-type: none"> • Initiate gradual return to competitive throwing • Perform dynamic warm-ups and stretches • Continue Advanced Throwers Ten program • Return to competition decision based on physician and rehabilitation team assessment <p>Return to play may occur when all conditions are met: Trunk, scapula, shoulder motions are normal Normal trunk, scapular, shoulder, and arm muscle strength are normal No pain while throwing Throwing balance, rhythm and coordination are normal</p>

ROM: range of motion. Note 6 month return to play is possible, but some players may require additional time.

Above protocol adapted from Dugas and Wilk:

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 Apr;49(4):253-261. doi: 10.2519/jospt.2019.8215. Epub 2019 Mar 12. PubMed PMID: 30862273.

Exercises in the Throwers Ten Exercise Program

- Diagonal-pattern D2 extension
- Diagonal-pattern D2 flexion
- Shoulder external rotation at 0° of abduction
- Shoulder internal rotation at 0° of abduction
- Shoulder abduction to 90°
- Shoulder scapular abduction, external rotation (“full cans”)
- Side-lying shoulder external rotation
- Prone shoulder horizontal abduction
- Prone shoulder horizontal abduction (full external rotation, 100° of abduction)
- Prone rowing
- Prone rowing into external rotation
- Press-ups
- Push-ups
- Elbow flexion
- Elbow extension
- Wrist extension
- Wrist flexion
- Wrist supination
- Wrist pronation

All exercises performed against resistance to improve strength.

Full description:

Wilk KE, Arrigo CA, Hooks TR, Andrews JR. Rehabilitation of the overhead throwing athlete: there is more to it than just external rotation/internal rotation strengthening. PM R. 2016; 8: S78– S90.

Exercises in the Advanced Throwers Ten Exercise Program

Elastic Tubing/Band Resistive Exercises

- Shoulder external rotation at 0° of abduction while seated on a stability ball*
- Shoulder internal rotation at 0° of abduction while seated on a stability ball*
- Shoulder extensions while seated on a stability ball[†]
- Lower trapezius isolation while seated on a stability ball[†]
- High row into shoulder external rotation while seated on a stability ball[†]
- Biceps curls/triceps extensions while seated on a stability ball[†]

Isotonic Dumbbell Resistive Exercises

- Full can while seated on a stability ball[†]
- Lateral raise to 90° while seated on a stability ball[†]
- Prone T's on stability ball[†]
- Prone Y's on stability ball[†]
- Prone row into external rotation on stability ball[†]
- Sidelying shoulder external rotation
- Wrist flexion/extension and supination/pronation

*Contralateral sustained hold performed during exercise

[†]Exercises are performed in 3 distinct continuous movements per exercise: bilateral active exercise, alternating reciprocal movement, and a sustained contralateral hold

10 - 15 repetitions performed for each movement successively, without rest, to complete 1 set. Goal: perform 2 full cycles of the entire program without pain, using sound technique and no substitution.

Full description:

Wilk KE, Yenchak AJ, Arrigo CA, Andrews JR. The Advanced Throwers Ten Exercise Program: a new exercise series for enhanced dynamic shoulder control in the overhead throwing athlete. *Phys Sportsmed*. 2011; 39: 90– 97.

Criteria to Initiate Phase 1 Interval Throwing (Long Toss)

- Full, painless ROM
 - Shoulder total ER/IR ROM in 90° of shoulder abduction within 5° of nonthrowing shoulder
 - Shoulder horizontal adduction of 40° or greater on throwing shoulder
 - Glenohumeral IR deficit < 15°
 - Elbow and wrist passive ROM within normal limits
- Shoulder, elbow, and wrist strength based on manual muscle test, handheld dynamometer, or isokinetic testing
 - ER/IR ratio of 72% - 76%
 - ER/abduction ratio of 68% - 73%
 - Throwing-shoulder IR > 115% compared to nonthrowing shoulder
 - Throwing-shoulder ER > 95% compared to nonthrowing shoulder
 - Throwing-arm elbow flexion/extension 100% - 115% compared to nonthrowing arm
 - Throwing-arm wrist flexion/extension and forearm pronation/supination 100% - 115% compared to nonthrowing arm
- Satisfactory clinical examination
 - No pain, tenderness, or effusion
 - Negative laxity testing: prone valgus stress and milking maneuver
 - Negative special test for other elbow or shoulder pathology
 - Physician and rehabilitation team clearance
- Successful completion of all steps in the rehabilitation process
- Satisfactory functional test scores
 - Prone ball-drop test (throwing side 110% or greater compared to the nonthrowing side)
 - One-arm ball throws against the wall using a 0.9 kg (2 lb) plyoball for 30 seconds without pain and exhibiting the ability to maintain 90°/90° arm position without compensation (throwing side greater than 90% of nonthrowing side)
 - Throwing into plyoback rebounder with 0.45-kg (1-lb) plyoball for 30 seconds with no pain, normal mechanics (without substitution) with good control
 - Single-leg step-down for 30 seconds, controlling pelvis and lower extremity alignment for both sides (limb symmetry: 95%+)
 - Prone plank test for time
- Minimum Kerlan-Jobe Orthopaedic Clinic throwers' assessment score of 85

ER: external rotation; IR: internal rotation; ROM: range of motion.

Adapted from:

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 Apr;49(4):253-261. doi: 10.2519/jospt.2019.8215. Epub 2019 Mar 12. PubMed PMID: 30862273.