

## ELBOW ULNAR COLLATERAL LIGAMENT REPAIR WITH AUGMENTATION REHABILITATION PROTOCOL

	RANGE OF MOTION	IMMOBILIZER	EXERCISES
<b>PHASE I</b> 0-6 weeks	<b>0-1 weeks:</b> None <b>2 weeks:</b> elbow 30-110° <b>3 weeks:</b> elbow 10-125° <b>4 weeks:</b> elbow 0-145°	<b>0-1 weeks:</b> splint <b>2 weeks:</b> brace 30-110° <b>3 weeks:</b> brace 10-125° <b>4 weeks:</b> brace 0-145°	<b>0-1 weeks:</b> wrist motion and hand motion <b>2 weeks:</b> active ROM shoulder, scapular isometrics <b>3 weeks:</b> 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). <b>4-6 weeks:</b> 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			
<b>PHASE II</b> 6-8 weeks	Progress to full ROM	Discontinue Brace at 6 weeks	<b>Starting Week 6:</b> <ul style="list-style-type: none"> <li>• Initiate Advanced Throwers Ten program</li> <li>• Initiate 2-hand plyometrics: chest pass, side-to-side throw, and overhead pass</li> <li>• Initiate prone plank exercise</li> </ul> <b>Starting Week 8:</b> <ul style="list-style-type: none"> <li>• Progress to 1-hand plyometrics: 90°/90° ball throw, 0° ball throw</li> <li>• Continue with Advanced Throwers Ten program</li> <li>• Initiate side plank with shoulder ER strengthening exercise</li> </ul> No aggressive weight lifting until 12 weeks post operatively <b>No chest flies or lifts stressing ligament</b> 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><b>PHASE III</b> 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"> <li>• Seated chest-press machine</li> <li>• Seated row machine</li> <li>• Biceps/triceps machine or cable strengthening</li> <li>• Interval hitting program</li> </ul> <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"> <li>• No pain or stiffness while throwing</li> <li>• No pain or stiffness after throwing</li> <li>• Strength is maintained and fatigue is minimal after completion of final set</li> <li>• Throwing motion is effortless with appropriate mechanics</li> <li>• Accuracy and throwing lines are consistent</li> </ul>
<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><b>PHASE IV</b> 14+ weeks</p>	<p>Weeks 14 – 16:</p> <ul style="list-style-type: none"> <li>• Continue Phase III exercises</li> <li>• Continue and progress interval throwing program.</li> <li>• Athletes may progress through ITP at different rates/paces</li> <li>• 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</li> </ul> <p>Weeks 16 to 20</p> <ul style="list-style-type: none"> <li>• Continue ROM and stretching programs</li> <li>• Continue Advanced Throwers Ten program</li> <li>• Continue plyometrics</li> <li>• Initiate ITP phase 2 (off the mound) when phase 1 is complete and athlete is ready</li> <li>• 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.</li> </ul> <p>Weeks 20+</p> <ul style="list-style-type: none"> <li>• Initiate gradual return to competitive throwing</li> <li>• Perform dynamic warm-ups and stretches</li> <li>• Continue Advanced Throwers Ten program</li> <li>• Return to competition decision based on physician and rehabilitation team assessment</li> </ul> <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<sup>†</sup>
- Lower trapezius isolation while seated on a stability ball<sup>†</sup>
- High row into shoulder external rotation while seated on a stability ball<sup>†</sup>
- Biceps curls/triceps extensions while seated on a stability ball<sup>†</sup>

### Isotonic Dumbbell Resistive Exercises

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

\*Contralateral sustained hold performed during exercise

<sup>†</sup>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.