

October 2023



No. 81

FOCUSED MUSCLE STABILIZATION FOR WRIST INSTABILITY

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Normal wrist function depends upon both static ligament support and dynamic muscle stabilization. To improve stability in a wrist lacking ligament support, rehabilitation concentrates on activating the key stabilizing muscles. The muscle activation exercises suggested below for common wrist instabilities is based on the work of [Esplugas, et al.](#)

Contraction of the extrinsic wrist muscles either produces a pronation or supination force on the distal carpal row. Supination tightens one group of carpal ligaments while the other group becomes slack, and the opposite occurs with pronation. Thus, wrist muscles can be classified either as pronators or supinators:

DISTAL CARPAL ROW PRONATORS	DISTAL CARPAL ROW SUPINATORS
Extensor carpi ulnaris (ECU)	Extensor carpi radialis longus (ECRL)
Flexor carpi radialis (FCR)	Extensor carpi radialis brevis (ECRB)
	Abductor pollicis longus (APL)
	Flexor carpi ulnaris (FCU)

SCAPHOLUNATE INSTABILITY

The goal of muscle activation with scapholunate instability is to support the scapholunate (SL) joint through simultaneous contraction of the ECRL, ECRB, and APL muscles (carpal supinators) and then contraction of the FCR muscle (carpal pronator). This is called dart thrower's motion. While both the ECU and the FCR are distal row pronators,

Esplugas, et al. found that only the ECU transmits a pronation force to the scaphoid, while the FCR slightly supinates the scaphoid, thus keeping the SL joint reduced.

It is important to initiate SL isometric exercises with the forearm in pronation to minimize ECU muscle tension. Because the ECU pronates the scaphoid, its contraction places unwanted tension on the scapholunate ligament while it heals.

Isometric exercises provide muscle re-education without producing active motion through the carpal joints. As the SL ligament heals, the patient progresses to isotonic exercises, slowly loading the wrist through the range of motion, while also adding wrist [proprioceptive training](#). We use the newly available [WriStable](#)® (Figure 1) during proprioceptive training to enhance neuromuscular control, especially when the wrist is loaded. See [Figure 2: Wrist Instability Exercise Chart](#).



Figure 1: The WriStable® Wrist Brace is worn during proprioceptive exercises for SL instability.

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FOCUSED MUSCLE STABILIZATION FOR WRIST INSTABILITY (continued)

LUNOTRIQUETRAL INSTABILITY

Muscle activation to stabilize the lunotriquetral (LT) joint focuses on activating the ECU muscle (carpal pronator). The powerful ECU assists in extending the triquetrum, thereby decreasing tension on the LT ligament.

Initiate exercises in supination to decrease the mechanical advantage of the ECRL, ECRB, APL, and FCU (carpal supinators). Begin with a sub-maximal ECU isometric contraction with the forearm in supination to maximize wrist stability.

As the ligament heals, progress the exercises from isometric to isotonic and the forearm position from supination to a neutral position. Proprioceptive wrist exercises may be introduced alongside the isolated ECU exercises as the position progresses from supination to a neutral position. See *Figure 2: Wrist Instability Exercise Chart*

PALMAR MIDCARPAL INSTABILITY

The goal with palmar midcarpal instability is to maintain wrist stability during radial and ulnar wrist deviation by activating alternating ECU (carpal pronator) and FCR (carpal supinator) muscle contractions. Forearm supination maximizes the stabilizing effect of the ECU and FCR on the carpus during these exercises.

Begin with isometric ECU exercises with the forearm in supination. As the ligament heals progress to alternating isometric wrist radial flexion and isometric ulnar wrist extension, (reverse dart thrower's motion.) Continue the exercises while progressing to a position of the forearm in neutral and then in pronation. See *Figure 2: Wrist Instability Exercise Chart*

FOCUSED REHABILITATION

Rehabilitation of an unstable wrist requires knowledge of complex wrist anatomy and kinesiology.

A stable wrist depends upon accurate bony alignment, intact ligaments, a proper functioning sensorimotor system, and balanced muscle support. When one of these systems fails, our rehabilitation must use the anatomy advantageously to activate and strengthen the stabilizing muscles that can best substitute for weakened/injured ligaments.

Interested in learning more? I recommend this succinct lecture [by Dr. Marc Garcia-Elias](#).

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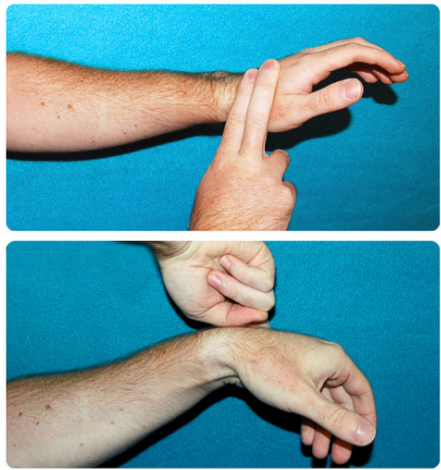
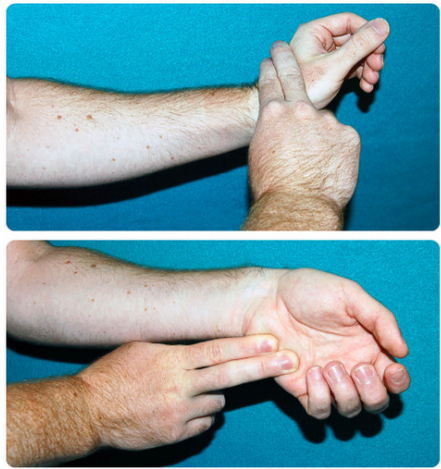

SCAPHOLUNATE INSTABILITY			
FOREARM POSITION	MUSCLE EXERCISE	EXERCISES: PROGRESSION SEQUENCE	IMAGE/VIDEO
Pronation	Isometric	<p>1) Radial wrist extension & thumb CMC radial abduction (ECRL, ECRB, and APL) alternating with</p> <p>2) Ulnar wrist flexion (FCU); <i>Called dart thrower's motion</i></p>	
Begin in pronation; progress into supination	Isotonic	<p>1) Radial wrist extension & thumb CMC radial abduction (ECRL, ECRB, and APL) alternating with</p> <p>2) Ulnar wrist flexion (FCU); <i>Called dart thrower's motion</i></p>	
Various Positions	Proprioceptive Training	<p>Active wrist control in mid-range in a variety of positions with minimal loading. See Karagiannopoulos & Michlovitz.</p>	

Figure 2: Wrist Instability Exercise Chart ([Click to download PDF](#))

NOTE: Therapists must determine the appropriate exercise(s) and exercise sequence for each patient: photos above are examples only.

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(continued)



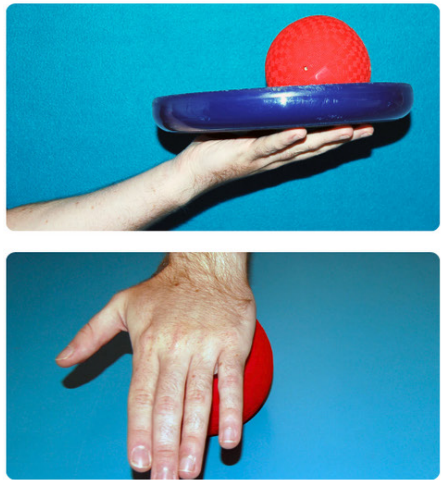
LUNOTRIQUETRAL INSTABILITY			
FOREARM POSITION	MUSCLE EXERCISE	EXERCISES: PROGRESSION SEQUENCE	IMAGE/VIDEO
Supination	Submaximal isometric	Ulnar wrist extension (ECU)	
Begin in supination; progress to neutral	Begin with isometric and progress to isotonic	Ulnar wrist extension (ECU)	
Various Positions	Proprioceptive Training	Active wrist control in mid-range in a variety of positions with minimal loading. See Karagiannopoulos & Michlovitz .	

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(continued)






PALMAR MIDCARPAL INSTABILITY			
FOREARM POSITION	MUSCLE EXERCISE	EXERCISES: PROGRESSION SEQUENCE	IMAGE/VIDEO
Supination	Isometric	Ulnar wrist extension (ECU)	
Begin in supination; progress to neutral and then pronation	Begin with isometric and progress to isotonic	1) Ulnar wrist extension (ECU) 2) Radial wrist flexion (FCR); <i>Called reverse dart thrower's motion</i>	 
Various Positions	Proprioceptive Training	Active wrist control in mid-range in a variety of positions with minimal loading. See Karagiannopoulos & Michlovitz .	 

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