Characterizing Ulnocarpal Instability in the General Population

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Introduction

The diagnosis and management of ulnar sided wrist pain is a challenge for the physician due to the complex joint articulations and ligamentous structures involved in the area. A main focus of this discussion is on DRUJ dysfunction as a source of this pain, and surgical techniques have focused on restoring this joint and eliminating pain through restoring wrist stability. The chief author of this study, had noted on some examinations that there is additional rotational instability in supination that may exist without DRUJ dysfunction, defined as ulnocarpal instability (UCI). This may be demonstrated through the use of the so-termed supination test, in which the DRUJ is stabilized with one hand while the other hand provides dorsal and volar translation at the ulnar side of the carpus. This ulno-carpal stability is largely defined by the TFCC, a complex collection of soft tissue fibers, consisting of a central disc, meniscus homologue and extensor carpi ulnaris sheath. A number of lesions to the TFCC have been described and classified, with differing effects on wrist stability. The investigators of this study aimed to examine characteristics of ulnocarpal instability in the general population using the supination test. Further, the use of fluoroscopy to provide quantitative measures of this instability through the Triquetrum Rotational Index (TRI) is examined.

Methods

A cross sectional study was performed composed of volunteers recruited from students, residents and patients presenting to the upper extremity clinic. Exclusion criteria included age under 18, casted or externally fixated wrist, or visit for fracture care. IRB approval was obtained and each patient signed informed consent to participate in the study. All patients completed a questionnaire with demographic information, prior injury history and participation in certain activities. During a research clinic visit, the supination test described above was performed by the lead author and used as a gold standard for determination of UCI. Chi-squared testing was used to evaluate correlating factors with UCI. Determination of triquetral rotational index was performed using live fluoroscopy. An anterior-posterior view was performed and video was recorded while performing a supination test as described above. The length of the triquetrum, defined, as its widest dimension was measured while in neutral position and at maximum supination of the wrist. TRI was calculated as the percentage of triquetral length change. Evaluation of the suitability of TRI measurement for determining instability was performed using results of the supination test as a gold standard. A receiver operating curve (ROC) was determined using area under curve (AUC) analysis and optimal test threshold was determined using the least squares method.

Results

A total of 120 patients (240 wrists) participated in the study, 45 males and 75 females. Using the supination test as a gold standard, the prevalence of instability in this population was determined to be 52%, as shown in the **Table**. Demographics, including age, height, weight and sex did not affect clinical wrist stability. Instability predominantly affected the nondominant hand (p-value<0.001). Analysis of prior injury or intervention at the wrist, indicates that a history of wrist sprain was associated with UCI, with a p-value of 0.02 (n=14). Patients in this population with prior wrist fractures were more likely to be unstable, though this was not statistically significant, with a p-value of 0.07. There was a statistically significant association between UCI and concomitant IOLT tears (p-value<0.001). Recreational activity participation was not associated with UCI.

Evaluation of TRI as a quantitative test of wrist instability was also performed. A total of 105 wrists were evaluated using fluoroscopy, with a UCI prevalence of 60%, using the supination test as a gold standard. Stable wrists had an average TRI of 8.19 and unstable of 19.35, a statistically significant difference (p<0.001). ROC analysis was performed. The AUC was 0.790 (CI:0.703-0.876), indicating that this test is of fair to good quality. Using the least squares method to optimize for sensitivity and specificity, a cutoff point for TRI of 11.5 was determined. This cutoff provides a sensitivity of 67%, and specificity of 79%.

Table: Characteristics of study participants: Demographic and clinical history of participants is compared between wrists judged as stable or unstable using the supination test.

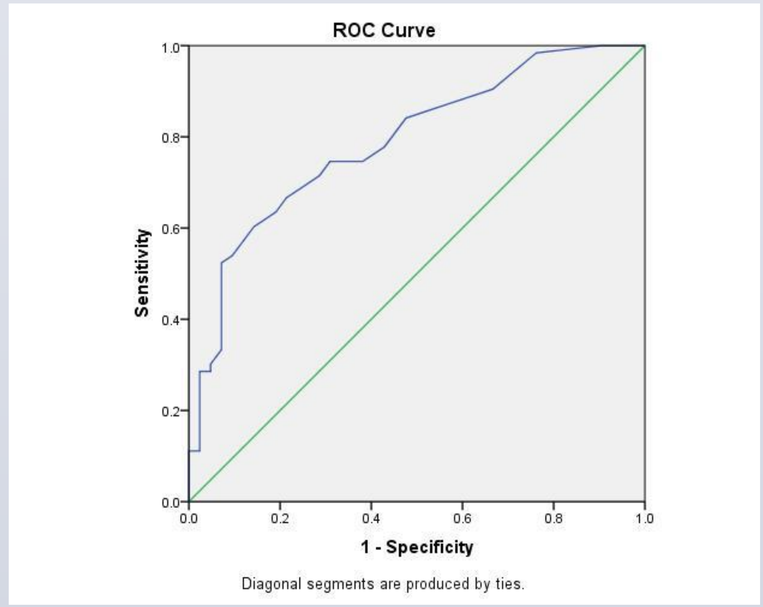
		Total Stable	Total Lax	P-value
Gender	all	125	115	-
	Male	52	38	0.280
	Female	73	77	0.402
Demographics	Age Average	45.99	43.07	
	Age SD	15.44	16.87	
History	Sprain	3*	11*	0.022
	Fx	8	16	0.066
	tendonitis	14	6	0.109
	surgery	24	14	0.172
Handedness	Dominant	77*	34*	<0.001
	Nondominant	40*	71*	0.001
Other exam findings	IOSL	4	9	0.124
	IOLT	2*	25*	<0.001
	WROM clunk	2	5	0.213
Activity	golf	16	12	0.592
	tennis	31	33	0.559
	gym	30	30	0.747
	watersports	14	20	0.203
	housework	26	22	0.773
	bike	7	9	0.505
	ball sports	46	34	0.332
	other	24	28	0.392

Discussion

UCI was noted in the majority of patients in this study. Prior wrist injury appears to increase the likelihood of UCI, and the nondominant hand is most commonly affected. Given that study participants were recruited from the general population and general hand clinic patients, UCI may be an asymptomatic occurrence. It remains a question whether UCI provides functional impairment or pain. Ulnar sided pain is often addressed by fixing DRUJ dysfunction to improve stability. Given this surgical technique, it would be prudent to address UCI in addition to DRUJ dysfunction. Adaptation of the Herbert sling for this purpose may provide this stability. In this technique the extensor retinaculum is imbricated proximally to provide stability across the DRUJ and UC joint. Such a repair could theoretically provide a more stable construct. Further, the use of TRI for quantitative measure of UCI is a fair to good quality test that may be of use for further studies on UCI. When compared with a prior ulnotriquetral exam technique evaluated with arthroscopy, TRI provides similar sensitivity and specificity (LaStayo 1995).

Significance

We have demonstrated that UCI is a common occurrence that is independent of DRUJ dysfunction. Further studies will demonstrate biomechanical and clinical outcomes of addressing UCI in surgical interventions for ulnar sided wrist pain.



Reference

LaStayo P, Howell J. Clinical provocative tests used in evaluating wrist pain: a descriptive study. J Hand Ther. 1995 Jan-Mar;8(1):10-7.