Triquetral Rotational Index: A Measure of Ulnocarpal Instability

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INTRODUCTION:

Ulnocarpal instability (UCI) is a challenging problem that may be the result of pathology at the distal radioulnar joint (DRUJ) and/or the ulnocarpal joint. UCI may be partially attributed to injury of the triangular fibrocartilage complex (TFCC), a key soft tissue stabilizer of the DRUJ and ulnocarpal joints. The TFCC consists of the triangular fibrocartilage proper, fibers originating from the subsheath of the extensor carpi ulnaris, the ulnocarpal ligaments, and the dorsal and palmar radioulnar ligaments. Symptoms of UCI include ulnar-sided wrist pain and abnormal supination of the ulnar carpus with respect to the forearm. To our knowledge, there is no tool currently available to diagnose this instability. The purpose of this study was to evaluate fluoroscopy as a diagnostic tool for UCI using image analysis. The length of the triquetrum was measured while in supination versus neutral position and the percent change was calculated. This measurement was termed the triquetral rotational index (TRI).

METHODS:

A total of 106 wrists from IRB approved volunteer subjects were included in our evaluation of wrist instability. Dynamic testing of ulnocarpal instability was performed using the supination test, a maneuver performed by stabilizing the DRUJ with a firm grasp while stressing the wrist in supination.[1] Rotation of the carpus off the distal ulna and/or reproduction of ulnar-sided wrist pain constitutes a positive supination test. Live fluoroscopy with the subjects hand in anterior-posterior view was performed during the supination test to evaluate and visualize movement of the bones. The length of the triquetrum was measured while in supination versus neutral position. TRI was calculated as the percentage of triquetral length change (Fig 1). Statistical analysis was performed using the Student's t-test, odds ratio and relative risk.

Figure 1: The shorter length of the line in B compared with A demonstrates the ulnocarpal instability present during dynamic testing.

RESULTS:

Based on the supination test, 64 wrists were found to have ulnocarpal instability, while 42 were found to be stable. A Student's t-test comparing wrists with a stable versus unstable supination test, confirmed a statistically significant difference in the triquetral rotation index ($p<0.001$). In this population, wrists with a TRI between 1 and 3 were more likely to be stable than unstable (Relative risk 10.0). Wrists with a TRI greater than 21 were more likely to be unstable than stable (Relative risk 5.67) (Fig 2).

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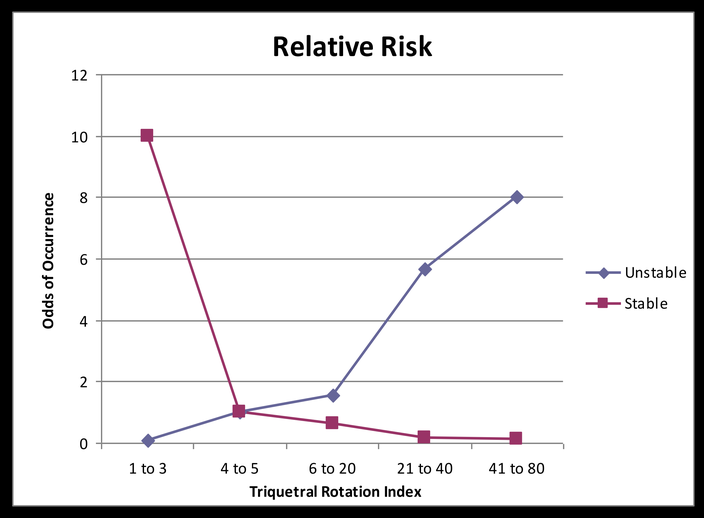

Fig 2: A wrist with triquetral rotation index (TRI) of 1-3 is 10 times more likely to be stable than unstable (Relative risk 10.0). Wrists with a TRI greater than 21 are at least 6 times more likely to be unstable than stable (Relative risk 5.67).

DISCUSSION:

Disruption of the TFCC is a common cause of UCI. In the current study, we have demonstrated that the TRI is an effective tool for the diagnosis of UCI. By utilizing dynamic, real-time fluoroscopy during the supination test, the examiner can evaluate and visualize the presence and amount of UCI. This is a quantifiable diagnostic tool that can be used to assess extent of impairment as well as response to treatment. The results of this study will be used to guide new image analysis methods for diagnosing this complex clinical problem.

SIGNIFICANCE:

Ulnocarpal instability presents a diagnostic challenge. The TRI was developed to help clinicians visualize and quantify the amount of UCI.

REFERENCES:

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