SCIENTIFIC ARTICLE

The Accuracy of the Scratch Collapse Test Performed by Blinded Examiners on Patients With Suspected Carpal Tunnel Syndrome Assessed by Electrodiagnostic Studies

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Purpose A diagnostic maneuver known as the "scratch-collapse test" (SCT), to aid in the diagnosis of compressive upper limb neuropathies such as carpal tunnel syndrome (CTS), has been described. There is a wide variability in the sensitivity and specificity values reported to date, and the reason for this discrepancy is unclear. The purpose of this study was to evaluate the utility of the SCT performed by examiners blinded to the meaning of the examination.

Methods Forty consecutive patients referred to a single physiatrist for electrodiagnostic testing for the evaluation of suspected CTS were included in the study. The patients were evaluated by blinded physician examiners with no knowledge of the SCT. The examiners were instructed on the maneuver but were not told the purpose of the test or the significance of a "positive" or "negative" response. Routine electrodiagnostic testing including nerve conduction studies and electromyography were also performed.

Results For the blinded examiners, the SCT had a sensitivity of 0.24, a specificity of 0.6, a positive predictive value of 0.73, a negative predictive value of 0.15, and the accuracy was 31%. The SCT performed by the attending physician demonstrated a sensitivity of 0.28, a specificity of 0.75, a positive predictive value of 0.81, a negative predictive value of 0.2, and the accuracy was 37%. All of the previous values are presented with electrodiagnostic studies as the reference standard for CTS. There was disagreement between the blinded, inexperienced examiners and the attending physician in only 3 of the 40 patients evaluated with the SCT.

Conclusions The SCT appears to have low sensitivity and specificity values relative to electromyography findings in patients with CTS when performed by examiners blinded to the meaning of the patients' response. Further study of this maneuver is necessary to fully assess its performance. *(J Hand Surg Am. 2017;■(■):■−■. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Diagnostic II.

Key words Carpal tunnel syndrome, provocative maneuvers, scratch collapse test.

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Upper extremity entrapment neuropathies are a common source of disability. The most common of these is compression of the median nerve in the carpal tunnel. Diagnosis of these conditions involves a history and physical examination, which includes provocative maneuvers. For carpal tunnel syndrome (CTS), Phalen test, Durkin or carpal compression test, and Tinel sign are commonly performed. The sensitivity and specificity of these tests is variable, and they often perform poorly in isolation when compared with diagnostic scales like the CTS-6.[1–3] Moreover, the performance of these maneuvers has been traditionally compared with electrodiagnostic testing, now increasingly considered inadequate as the reference standard.[3]

Recently, a diagnostic maneuver known as the scratch-collapse test (SCT), to aid in the diagnosis of compressive upper limb neuropathies, has been described.[3] The exact mechanism of this test is unknown, but it has been proposed that it involves an inhibition of shoulder external rotation in response to a noxious stimulus on the skin overlying the compressed nerve. For the diagnosis of CTS, Cheng et al[4] reported a sensitivity of the SCT of 64% with electrodiagnostic studies as the reference standard. Other investigators have suggested less utility of this maneuver.[5,6] The reason for this discrepancy is not clear.

The purpose of this study was to evaluate the performance of the SCT, in patients with presumed CTS, performed by examiners blinded to the meaning of the examination. We hypothesized that the examiner's knowledge of the patient's clinical presentation may lead to a bias when performing the examination and may be an explanation for the high variability in previously reported sensitivities and specificities. In particular, we suspect that if an examiner already believes that the patient has CTS, then the test is more likely to be positive.

METHODS

Institutional review board approval was obtained prior to the start of the investigation. The study group comprised 40 consecutive patients who were referred by fellowship-trained, orthopedic hand surgeons to a single physiatrist for electrodiagnostic testing for the evaluation of suspected CTS. The sample size selected was for convenience.

Blinded examiners comprised postgraduate year 4 residents in the Physical Medicine and Rehabilitation Division of our institution. These residents are assigned to work with one of the authors as part of a mandatory electrodiagnostics rotation. None of the residents expressed knowledge of the SCT prior to the start of the study. The 6 residents were shown how to perform the SCT at the carpal tunnel by the attending physician but were not told the purpose of the test or the significance of a "positive" or "negative" response. In addition, the residents watched a Web-based video, with no sound, demonstrating the maneuver.[7] The residents performed the SCT on patients prior to obtaining any other historical information or performing any other physical examination maneuvers.

In addition to, and separate from, the blinded examiners, the attending physiatrist obtained a history and physical examination, the standard provocative physical examination maneuvers (carpal compression test, Phalen, Tinel) and the SCT. The attending physician performs the SCT in the evaluation of patients with compression neuropathies. Routine electrodiagnostic testing including nerve conduction studies and electromyography (EMG) were then performed. Nerve conduction studies consisted of an evaluation of median and ulnar motor and sensory nerves in the symptomatic upper extremity and findings were compared with absolute normal values and relative values between the contralateral median nerve and the ipsilateral ulnar nerve. Median and ulnar sensory nerve action potentials were obtained by stimulating the nerve in the forearm 14 cm proximal to the "active" electrode, which picks up the electrical impulse at the base of the index finger and the proximal interphalangeal joint of the little finger, respectively. Motor nerve action potentials were achieved by stimulating the median nerve 8 cm proximal to the "active" electrode over the midpoint of the abductor pollicis brevis and the ulnar nerve 8 cm proximal to the abductor digiti minimi.

Electromyography was routinely performed on a sampling of muscles that are innervated by the C5-T1 nerve roots, brachial plexus, and peripheral nerves of the upper extremity. A standard muscle screen included deltoid, biceps, pronator teres, triceps, abductor pollicis brevis, first dorsal interosseous, and cervical paraspinal musculature. Each muscle was evaluated for spontaneous electrical potentials (positive waves, fibrillations). The degree of spontaneous activity was graded between from 0 to 4. Submaximal and maximal contraction of the musculature was performed to evaluate patients for motor unit morphology and recruitment pattern.

For all patients, median nerve sensory and motor latencies, and EMG changes were recorded. Distal sensory latencies greater than 3.6 ms and/or distal motor latencies greater than 4.4 ms were considered