

Scratch Collapse Test

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Introduction

Peripheral nerve compression is a common condition that is often challenging to diagnose. The causes of entrapment are multi-factorial, including nerve anatomy, patient physiological factors and trauma. The diagnosis of compressive neuropathies remain primarily clinical as the sensitivity of available electro diagnostic studies and ultrasound imaging varies from 49-84% [1]. Hence, the diagnoses of cubital and carpal tunnel syndromes rely heavily on clinical symptoms and provocative maneuvers for diagnosis. Scratch collapse test is a

relatively new provocative test which was initially introduced for cubital tunnel syndrome, but now has found use in many other compressive neuropathies of the upper and lower limbs.

Basis of the Test

Painful cutaneous stimulus has been noted to cause a period of inhibition in tonic voluntary muscle activity in animals including humans. This period of electromyographic silence has been termed the *cutaneous silent period*, first described by Hoffmann in 1922 [2]. Although its exact mechanism is poorly understood, it is generally thought to be an inhibitory spinal reflex that may play a protective role in facilitating withdrawal of a limb from potentially harmful stimuli [2]. External rotation of the arm is an inherently weak motion and thus is a good muscle group to test for this brief weakness. Thus, if you activate this spinal reflex by stimulating the nerve with a scratch, a brief ipsilateral weakness is seen in external rotation.

Test

The patient faces the examiner in sitting position with arms adducted, elbows flexed, and hands outstretched with wrists at neutral. The examiner asks the patient to externally rotate both the shoulders. The examiner resists the external rotation movement by placing the hands over the lateral aspect of the forearm and give an inward force [Figure 1A]. The patient is instructed to resist the force applied by the examiner. Next, the examiner “scratches” or swipes with fingertips over the area of nerve compression. The procedure mentioned above is immediately repeated. Brief temporary loss of the patient’s external resistance tone is considered a positive scratch collapse test [Figure1].

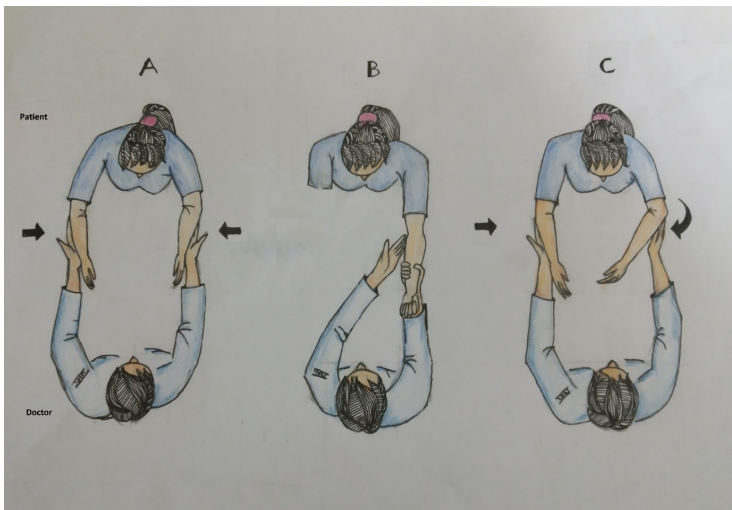


Figure 1: Illustrates the scratch collapse test. The patient faces the examiner with arms adducted, elbows flexed, and hands outstretched with wrists at neutral. Step A: The patient resists bilateral shoulder internal rotation to the forearms applied by the examiner. Step B: The examiner “scratches” or swipes with fingertips over the course of the compressed nerve (ulnar nerve at elbow illustrated). Step C: Step A is immediately repeated. Brief temporary unilateral reduction in the patient’s resistance to internal rotation is considered a positive scratch collapse test [3].

Indications

Scratch collapse test was originally described for compressive neuropathy of the ulnar nerve at the elbow (Cubital tunnel syndrome) and median nerve in the carpal tunnel (Carpal tunnel syndrome). Newer studies have found its usefulness in Peroneal nerve compression, Tarsal tunnel syndrome, Long thoracic nerve entrapment, Occipital neuralgia etc.

Advantages

1. A single test applicable for a number of compressive neuropathies.
2. The test can be repeated multiple times within a short duration without fatigue.
3. Multiple sites of compression along the same nerve can be identified [Hierarchical SCT].

Disadvantages

1. The exact mechanism of action of the response remains unknown.

2. As the test is positive only directly over the compression site, if the examiner tests proximal/distal to the site of compression, the test could be negative.
3. If the examiner tests a wide area of the nerve (including multiple potential sites of compression), a positive test would not be specific regarding the location of compression.
4. The appreciation of momentary weakness in external rotation is subjective. Hence it leads to less inter observer agreement and the test interpretation necessitates a learning curve.

Review of Literature

The scratch collapse test was originally described by Cheng et al in 2008 in which they compared the test with Tinel's sign and flexion/nerve compression in 169 patients Vs 109 controls [3]. One hundred nineteen patients were diagnosed with carpal

tunnel syndrome and 70 patients were diagnosed with cubital tunnel syndrome based on history, examination, and positive electrodiagnostic test. In their study, the Scratch Collapse Test had significantly higher sensitivity than Tinel's test and the flexion/nerve compression test for carpal tunnel and cubital tunnel syndromes. Accuracy for this test was 82% for carpal tunnel syndrome and 89% for cubital tunnel syndrome [3].

Davidge KM et al modified the SCT into hierarchical SCT to utilize the same in identifying patients with complex nerve compressions. In their study they performed SCT at 5 different compression sites along the ulnar nerve and noted the site that gave positive SCT. The primary site is then frozen with topical ethyl chloride and is retested to confirm that collapse no longer happens at this site. Then the second site of compression is frozen out and test repeated. The test is continued till no longer a positive SCT is recorded. They also opined the possibility of its utility in multilevel nerve compressions [4].

Justin M et al found SCT a reliable technique to localize the point of maximal nerve compression in patients with cubital tunnel syndrome wherein they found the Osborne's band to be the commonest site. They put forward the notion that SCT can help identify patients who can most likely to be benefited from simple nerve decompression than requiring a more extensive operation [5].

Turan et al have reported positive Scratch collapse test in Tarsal tunnel syndrome [6].

As per Makanji et al the accuracy of the test varies between examiners - 70% (Surgeon A) to 31% (Surgeon B). Cebron et al conducted a meta-analysis and observed that the accuracy of the SCT is highly varied in the previous studies that measured it and ranges from 0.31 to 0.93 (average of 0.67) [3,7-11]. The values were lower in the studies that used blinded examiners than in the studies where the examiners were experts in performing the SCT [11]. They also suggested that one factor for the variability in observations could be the learning curve and proper technique of

performing the test. They noted that people who learned the test directly from its original creators were able to reproduce it more successfully. The two studies with the highest levels of accuracy were both co-authored by Cheng and Susan Mackinnon who are the original authors of the test [3,10]. Huynh et al also conducted a systematic review and meta- analysis on scratch collapse test in carpal tunnel syndrome and found SCT to have poor sensitivity and moderate specificity [12].

Current available literature provides contradictory evidence on the accuracy of the SCT. In addition, the pathophysiology of the test mechanism is still not established. Current evidence does not support the use of SCT as an independent or superior test for diagnosing compressive neuropathies. However, it can be a valuable additional tool along with other clinical parameters for the diagnosis of nerve compression.

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