ADVANCE FOR PHYSICAL THERAPY & REHAB MEDICINE
GERIATRIC FUNCTION

By Carole Lewis, DPT, GCS, GTC, MSG, MPA, PhD, FAPTA, and Keiba Shaw, EdD, MPT, MA

Offset Tunnel Vision (and Pain) by Using the CTS Scale

You are sitting at your desk checking and responding to email and completing the numerous tasks that come with long hours in an office when you begin to notice an uncomfortable tingling and/or numbness in your wrist and hand.

Suddenly, a sharp, piercing pain shoots through the wrist and up your arm. This is not the first time you have noticed this pain, but have always brushed it off as a muscle spasm or cramp. This is tunnel vision--more likely is that you have developed carpal tunnel syndrome (CTS), a painful progressive condition caused by compression of the median nerve in your wrist.

Symptoms of CTS include tingling or numbness in your fingers or hand, especially your thumb and index, middle or ring fingers, essentially over the distribution of the median nerve. Pain radiating or extending from your wrist up your arm to your shoulder or down into your palm or fingers, especially after forceful or repetitive use may be apparent and usually occurs on the palm side of your forearm. Additionally, weakness in your hands may develop along with a tendency to drop objects.[1]

Identifying Causes

There are various causes for CTS including rheumatoid arthritis (RA), diabetes mellitus, thyroid dysfunction, fluid retention, injury and most often, repetitive use in which repeated flexion and extension of the tendons in the hand and wrist over long periods of time compress the nerve within the tunnel.

There are various risk factors for CTS such as gender (women > men) and heredity and various treatments for the alleviation of symptoms including, but not limited to non steroidal anti-inflammatory (NSAIDS), resting wrist splints and changing the work environment, carpal release surgery is often employed when these treatment do not work. While carpal tunnel release is effective in the alleviation of neuromuscular symptoms, patients are often more concerned with pain and function in their daily activities. To this end, Levine et al. (1993) sought to develop a self-administered questionnaire that could assess the severity of symptoms experienced and the functionality in people who have CTS.[2]

Description of Scales and Scoring

Levine et al. came up with six domains that they believed would be important to measure in individuals who have CTS. These domains, which make up the Symptoms Severity Scale, include pain, paresthesia, numbness, weakness, nocturnal symptoms and general/overall functional status. It consists of 11 questions and each question is scored based on responses ranging from mildest symptoms (1 point) to most severe symptom (5 points). Overall functional symptom severity score is determined by calculating the mean for all 11 of the individual items. Eight functional activities including writing, buttoning clothes, holding a book while reading, gripping a telephone handle, opening of jars, household chores, carrying of grocery bags, bathing and dressing. These items were then scored from No Difficulty (1 point), Mild difficulty (2 points), Moderate difficulty (3 points), Severe difficulty (4 points) and Cannot do at all due to hand or wrist symptoms (5 points).

Reliability and Validity

In order to determine the reproducibility (test-retest reliability) of both the Symptom Severity Scale and the Functional Status Scale, 31 patients (out of 67) diagnosed with carpal tunnel were asked to complete the entire instrument on two consecutive days. Pearson correlation coefficient was 0.91 for the Symptom Severity Scale and 0.93 for the Functional Status Scale indicating high test-retest reliability. To measure internal consistency Cronbach's α was utilized. Results indicated a Cronbach's $\alpha = 0.89$ for the Symptom Severity Scale and 0.91 for the Functional Status Scale.

Score of Severity

Correlations were conducted in order to assess the validity of the scales and their items yielding correlation that indicated worse scores for severity of symptoms and function when impairments were severe. Levine et al. indicate that other scores for severity of symptoms showed moderate correlations with grip and pinch strength

and weak correlations as compared to with two-point discrimination, pressure sensitivity on Semmes-Weinstein monofilament testing, as well as on tests for sensory conduction velocity of the median nerve. In assessing the validity of the functional status scores, there was a high correlation found with severity of symptoms, indicating functional limitations with increasing symptom severity. The functional status scores had moderate correlation with grip and pinch strength and a fair or poor correlation with objective measures of sensory function of the median nerve.

Sensitivity to clinical change, i.e. response to and satisfaction with carpal tunnel release surgery in terms of severity of symptoms and function was assessed pre and post surgical release. The preoperative symptom-severity score was 3.4 ± 0.67 points as compared to postoperative scores of 1.9 ± 1.0 points. The effect size was 1.4 indicating good responsiveness to the treatment intervention. The preoperative functional-status score was 3.0 ± 0.93 points, compared with a postoperative score of 2.0 ± 1.1 points. The effect size of the score on the Functional Status Scale was 0.82 indicating improvement pre-op to post-op.

Improvement in scores for both the severity of symptoms and improvement in functional status was associated with greater satisfaction with surgery. Spearman coefficient was used to measure the correlation between satisfaction with the result of the operation and improvement in the scores and was found to be 0.52 for the Symptom Severity Scale ($p = 0.0007$) and 0.29 for the Functional Status Scale ($p = 0.09$). Further improvements in symptom severity as well as function was seen three months later indicating that the Scales were able to detect changes that were consistent with results obtained clinically.

Conclusions

The Symptom Severity Scale and the Functional Status Scale has been shown to be effective in detecting clinical changes in pre and post operative carpal tunnel release surgery. The developers of the scales conducted fairly rigorous statistical analyses in order to establish reliability (internal consistency; test-retest) and validity of the items on both scales producing a questionnaire that can be used to assess function and symptoms related to carpal tunnel in a diverse age population (elderly and work age eligible persons). The use of this easily administered questionnaire can assist the physical therapist or other healthcare provider from developing tunnel vision and differentially diagnosis when it comes to evaluating the signs and symptoms related to carpal tunnel syndrome.

It is noteworthy to state that a reliable and valid six-item Symptom Severity Scale has been validated using a large number of subjects for use in individuals with carpal tunnel syndrome.[3] This scale, in conjunction with the 8-Item Functional Status Scale may decrease the amount of time it takes for persons with CTS to complete the questionnaire.

References

1. National Institute of Health (NIH). (2002). The Carpal Tunnel Syndrome fact Sheet. http://www.ninds.nih.gov/disorders/carpal_tunnel/detail_carpal_tunnel.htm accessed Jan. 31, 2010.
2. Levine, D., Simmons, B., Koris, M., Daltroy, L., Hohl, G., Fossel, A., & Katz, J. (1993). A self-administered questionnaire for the assessment of severity of symptoms and functional status in carpal tunnel syndrome. *Journal of Bone and Joint Surgery in America,* 75, 1585-1592.
3. Atroshi, I., Lyren, P., & Gummesson, C. (2009). The 6-item CTS symptoms scale: A brief outcomes measure for carpal tunnel syndrome. *Quality of Life Research*, 18, 347–358.

Dr. Lewis is a consulting clinical specialist for Professional Sportscare and Rehab and co owner of The Center of Evidence. She lectures exclusively for GREAT Seminars and Books, Inc. Dr. Lewis is also the author of numerous textbooks. Her Website address is www.greatseminarsandbooks.com. Dr. Shaw is Associate Professor for the School of Physical Therapy at Rueckert-Hartman College for Health Professions, Regis University, Denver, CO.