Low-Level Laser Therapy for Mild to Moderate CTS

By George Gedevanishvil, MD

Each year, more and more people suffer from symptoms associated with carpal tunnel syndrome (CTS). In fact, in the U.S. alone, it is the fastest growing job-related malady among workers.\textsuperscript{1} According to the U.S. Bureau of Labor Statistics, average number of days away from work were highest for people with CTS (average missed work days: 27) compared to all other major job-related trauma and sickness.\textsuperscript{2}

Anatomy of the Carpal Tunnel

Anatomically, the carpal tunnel (CT) is located on the ventral side of the wrist. It is formed by carpal bones and connective tissue, and joins the forearm with the middle section of the deep plane of the palm. The CT contains flexor ligaments and the median nerve. CTS is a very painful and oftentimes disabling condition that occurs when the median nerve becomes entrapped and compressed due to narrowing of the tunnel. This narrowing is caused by edema of the surrounding flexor tendons or mechanical impingement by the carpal bones.

The median nerve originates from and is formed from the median and lateral cords of the brachial plexus at C5, C6, C7, C8 and T1. It passes through the thoracic outlet and then between the two heads of the pronator teres muscle of the forearm, through the carpal tunnel and terminates in the fingers. It innervates the skin of the side of the thumb, the index and middle finger, and half of the ring finger.

Symptoms and Evaluation

Differential diagnosis of CTS should include thoracic outlet syndrome. The practitioner must be aware that in the clinical picture of thoracic outlet syndrome (compression of a nerve passing between the anterior scalene and middle scalene muscles), there may be sensory loss over the thenar eminence. This is in contrast to true CTS (compression within the canal) or pronator teres syndrome (compression of the median nerve in
the elbow region). This is because the palmer branch of the median nerve, which provides sensory innervations to that area, passes over the carpal tunnel and hence is not affected by impingement of the median nerve branches within the CT.⁴

CTS seems to be a multifactorial morbidity; its etiology can be traumatic and non-traumatic. Traumatic CTS is part of cumulative trauma disorders, associated mainly with a repetitive motion⁵ – for example, typing⁶ – whereas non-traumatic cases of CTS may be associated with many systemic disorders such as hypothyroidism, obesity and diabetes mellitus.⁷ CTS can also complicate pregnancy.⁸ In their research, Feldon and Terrono showed that CTS is the most frequent complication in patients with rheumatoid arthritis and recommended that every patient with RA should be tested for CTS.⁹

Clinical symptoms that patients suffering from CTS may experience are numbness or paresthesias over the affected area, as well as pain in one or both hands, extending as high as the elbow. Patients also report having trouble with fine finger movement, e.g., picking up a small object. A decrease in grip strength causes patients to drop things more frequently, which is one of the important things to inquire about during the history intake. In advanced or untreated cases, atrophy of the thenar muscles may occur.¹⁰

To make a correct diagnosis of CTS, the examiner should look for tenderness and the classic inflammatory signs: tumor, dolor, rubor, calor and functio laesa. The fingers should be tested for sensory abnormalities, and any signs of atrophy and decrease in strength. NCV and a MRI scan may also be included in diagnosis confirmation, as well as evaluation for the stage of the disease.

**Diagnostic Tests for CTS**

Some of the more specific diagnostic tests include Phalen’s maneuver and Tinel’s sign. To perform Phalen’s maneuver, the patient is asked to flex the wrist gently as far as possible and maintain this position until the symptoms, e.g., pain, occur.¹¹ The test is considered positive when a patient reports the feeling of numbness and/or pain. This test also may assist in analyzing the stage of the condition: the faster the symptoms occur, the more advanced the case of CTS.

Tinel’s sign is used for nerve irritation detection: as the median nerve becomes compressed, nerve irritation sets in. The test is performed by lightly tapping the skin over the flexor retinaculum to elicit paresthesia in the median nerve distribution area.
Even though Tinel’s sign is less sensitive than Pathel’s, research indicates that it is somewhat more specific than Phalen’s sign. It is worth noting that Phalen’s test has been found to be the only test to correlate the severity of CST in prospective studies.12

**Conservative Management With Low-Level Laser Therapy**

Mainstream medical approaches to the management of patients with CTS focus on prescribing medications, such as painkillers and steroid hormone injections, along with nightly splinting, often disregarding natural and much safer alternatives. For example, over the years, extensive studies have been performed showing the efficacy of low-level laser therapy in managing patients with CTS.

Dincer, et al., conducted a study of 100 hands of female patients with bilateral CTS. The aim of the study was to determine the most effective therapeutic approach in managing patients with CTS. Therapeutic modalities such as ultrasound, splinting and low-level laser therapy (alone or in combination) were evaluated. Researchers concluded that between stand-alone and combination therapies, the combination of low-level laser therapy and splinting was superior to any other modality used.13

Clinical research has also validated the effectiveness of low-level laser therapy in pain and inflammation relief, two major accompanying factors to CTS. Mizutani, et al., proved the analgesic effects of LLLT and correlated it with a decrease in PGE 2 levels.14 Bjordal, et al., using a 904 nm GaAs laser, showed its effectiveness in decreasing tissue inflammation.21 And Wakabyashi demonstrated that laser light can decrease pain by blocking depolarization of C-fiber afferents.15

A study of 372 patients suffering from conditions ranging from rheumatic to traumatic and degenerative, and complicated by pain and inflammation, were initially treated with medications and different types of lasers with a poor outcome. The use of a GaAs (904 nm) laser achieved more substantial pain relief and improved the quality of life for those patients. These effects are thought to be due to its ability to cause increased transformation of PGG2 and PGH2 (pro-inflammatory cytokines) into PGI2 (prostacycline), with known vasodilation and anti-inflammatory actions.20 Low-level laser has also been shown to affect the release of bradykinin, a potent analgesic.16

Unfortunately, for advanced cases of CTS, surgery still remains a treatment of choice, but for mild to moderate stages of the condition, laser therapy has been shown to provide significant relief and improvement. Wen-Dien Chang, et al., concluded that in the treatment of mild to moderate cases of CTS,
low-level laser therapy was successful in lessening pain and symptoms, as well as improving functionality and strength in the fingers and hand. Most importantly, laser therapy had no reported side effects.\textsuperscript{17}

Shooshtari, et al., conducted a study of 80 CTS patients versus a control group using low-level laser therapy. Results of the study were analyzed by utilization of the VAPS scale, a dynamometer for grip strength, a median sensory nerve conduction velocity study, as well as EMG. At the end of the study, the group receiving laser therapy demonstrated significant improvement in both subjective and objective clinical signs and symptoms associated with CTS compared to the control group, leading the researchers to conclude that low-level laser therapy is an effective modality for treating patients with CTS.\textsuperscript{18}

Utilization of low-level laser therapy for managing different conditions is gaining wider acceptance each year. More than 3,000 studies have been published to date and every year this number is growing by hundreds of new studies. With laser therapy having virtually no side effects\textsuperscript{19} and limited contraindications, it is a treatment of choice for mild to moderate CTS as well as many other conditions complicated with pain and inflammation. It’s use in the modern chiropractic practice is an affective adjunct to the chiropractic adjustment. It increases its efficiency and addresses correction of the problem from a different angle, which speeds up patient recovery by decreasing inflammation and improving the body’s intracellular biochemical processes.

References


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