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Laser Acupuncture Shows Promise in Treating Carpal Tunnel Syndrome

By Michael Devitt

The incidence of carpal tunnel syndrome, or CTS, has increased dramatically in the past 25 years, with the majority of cases occurring in workers whose tasks involve repetitive hand movements.
The condition has had a debilitating effect, literally and figuratively, on the American work force. Studies conducted by the U.S. Department of Labor show an almost 10-fold increase in the number of disorders associated with "repeated trauma" between 1981 and 1991. In 1995, 50% of all workers diagnosed with CTS missed 30 or more days of work due to the condition.[1,2]

Carpal tunnel is also extremely expensive to treat. A 1998 study found that the most common surgical procedure for CTS, release of the transverse carpal ligament, is performed approximately 460,000 times a year, at a direct medical cost of nearly $2 billion.[3] Another study published in 1997 concluded that the average cost to treat one case of CTS nationwide, including surgery, was approximately $12,000.[4] Only about 40% of patients who undergo surgery for carpal tunnel syndrome regain normal use of their hands; approximately one-third continue to experience pain and loss of function, and another five percent actually get worse.

Just as ergonomists have looked for ways to reduce the rate of CTS at home and in the workplace, scientists have also looked at ways of treating, or even curing, those already diagnosed with the condition. A new study published in the *Archives of Physical Medicine and Rehabilitation*[5] has delivered promising news for longtime CTS sufferers. Using a combination of laser acupuncture and electrical stimulation, researchers were able to reduce pain and tingling in the affected hands and wrists, with results so dramatic that every patient who received treatment was able to return to their original jobs after the study ended.

The study included 11 patients diagnosed with carpal tunnel syndrome (nine men, two women, average age 53.5). All 11 subjects had tried more conservative treatments, including anti-inflammatories and wrist splints, from 3-30 months without obtaining effective pain relief. Prior to the start of the study, the patients were subjected to a battery of neurological and physical tests to determine the severity of the symptoms. Five patients were diagnosed with borderline/mild CTS; the rest were diagnosed as moderate.

Patients were randomized to receive two series of real or sham treatments. Patients were treated every Monday, Wednesday and Friday for three or four consecutive weeks, for a total of 9-12 treatment sessions. The study used a crossover design, meaning that after the first treatment series was completed, patients "crossed over" and received the other treatment. Patients were evaluated at baseline and within a week after the end of each treatment series. Scores taken at the end of the first treatment series were used as pretreatment scores for the second series.

Three devices were used to deliver care: a red-beam laser (continuous wave, 15 milliwatts, helium/neon, with a two-millimeter diameter probe tip) for shallow acupuncture points on the hand and fingers; an infrared laser (9.4 watts, gallium/arsenide diode, pulsed, with a five-millimeter diameter probe) for deeper points along the elbow, shoulder, upper back and cervical spine; and a microamps TENS device applied to the affected wrist.

The study utilized a complicated, sequential approach to care. In the first step of a "real" treatment session, the red-beam laser was placed perpendicularly directly on the skin of the affected hand at acupuncture point PC7. Next, the circular electrode for the TENS device was applied to the skin and centered over PC7, while the grounding pad was applied to the skin and centered over point TW4 near the wrist. After being taped into place, the TENS device was turned on and, after a subsensational level was obtained, pulsed frequencies were used on the hand for a total of 20 minutes.

While the TENS device was delivering treatment at PC7, the red-beam laser was moved and applied to other points on the hand for 66.6 seconds per point. Finger points such as Lu11, LI1, PC9, TW9, Ht9 and SI1 were used because of their distinction as well points for each meridian that passes through the wrist. Other points (such as Lu9, Ht7 and 8, PC8 and *ba xie* points in the webbing of the fingers) were chosen because they are traditionally used to treat hand pain.

Also during the TENS treatment, the infrared laser was applied to no less than five deeper acupuncture points on the upper arm, the upper trapezius muscle, and the cervical spine. Each point was treated for a minimum of one minute at each of three pulse settings (73, 584 and 3,500 pulses per second) and varying frequencies. Points used varied by patient, but generally included TW5 and 9; PC6; and LI 10, 11 and 15. For the cervical spine, the researchers used *hwa to* points lateral to the cervical 5 to thoracic 1 vertebrae, along with GB20; SI 10 and 11; and other locally painful points. Each treatment session lasted 35-45 minutes depending on the number of points stimulated.

During the sham phase, each patient was subjected to the same regimen, but with controls installed to ensure the devices were not being used. For example, during sham laser treatments, there was no emission from either the red or infrared lasers. In addition, the TENS device was turned off during sham treatment. All treatments were also performed with the patient's elbow, forearm and hand placed below and through the bottom of a black curtain, so that patients could not see whether the devices were turned on.

Several tests were used to measure the outcomes of care, including the McGill Pain Questionnaire, which measures the severity of pain using several physical and psychological factors. The scientists also performed tests to determine entrapment or irritation of the median nerve of the affected hand.

Results

Three patients responded extremely well to the sham treatment. The researchers stated that this response was "consistent with placebo response rates in which sham LLLT has been included in studies to treat pain"; therefore, their results were not incorporated into the analysis.

Of the remaining eight patients, none experienced a significant reduction in pain following the sham treatment; however, seven patients reported 50% or greater pain reduction following real acupuncture, either as the first or second treatment series. The average MPQ score dropped from 21.87 pre-real acupuncture to 3.75 post-real acupuncture, a decrease of approximately 83%.

McGill Pain Questionnaire Scores, Pre- and Posttest
After Receiving Real Treatment
Mean pretest score: 21.87 (out of 78)
Mean posttest score: 3.75
Difference: -18.13
After Receiving Sham Treatment
Mean pretest score: 11.38 (out of 78)
Mean posttest score: 14.00
Difference + 2.62

Tests using the Phalen's and Tinel's signs to detect nerve entrapment or irritation also appeared encouraging. Seven of nine patients who tested positive for the Phalen's sign prior to real treatment tested negative following real acupuncture; only one of eight patients who had a positive Phalen's sign before being treated with sham acupuncture tested negative afterward.

Similarly, all six patients with a positive Tinel's sign prior to real treatment tested negative after receiving real acupuncture. In those who received sham acupuncture first, the number of patients with a positive Tinel's sign actually increased.

Positive Phalen's Sign, Pre- and Posttest
After Receiving Real Treatment
Positive sign, pretest: 9/11
Positive sign, posttest: 2/11
After Receiving Sham Treatment*
Positive sign, pretest: 6/8
Positive sign, posttest: 5/8
* Three patients did not take a sham pretest or posttest for Phalen's sign.

Positive Tinel's Sign, Pre- and Posttest
After Receiving Real Treatment
Positive sign, pretest: 6/11
Positive sign, posttest: 0/11
After Receiving Sham Treatment*
Positive sign, pretest: 1/8
Positive sign, posttest: 3/8
* Three patients did not take a sham pretest or posttest for Tinel's sign.

The researchers noted an enormous potential cost savings in treating CTS with laser acupuncture compared to more traditional methods. Using a baseline of $65 per office visit, a series of 15 laser acupuncture and TENS sessions would cost $975, compared to the estimated $5,246 it currently takes to treat one case of carpal tunnel syndrome in the U.S. without using surgery.[4] "Thus, there is a potential savings of at least $4,000 per mild to moderate CTS case," they concluded.

In an interview with Reuters Health,[6] Dr. Margaret Naeser, a neurologist at Boston University School of Medicine and lead investigator of the study, said the reasons behind laser acupuncture and TENS' effectiveness in treating carpal tunnel syndrome remain unknown. However, she added that laser therapy has been known to act as an anti-inflammatory, and offered other possible explanations, including increased levels of serotonin and endorphins and improved local blood circulation. She also had no reservations about suggesting laser acupuncture as a primary form of care for CTS.

"It is my recommendation that this therapy be used as a first-line treatment," Naeser said. "Rather than just simply alleviating the pain and symptoms, the treatment appears to cure the problem, although we have no way of knowing" how long patients remain pain-free without repeated followup visits.

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[IMAGE]