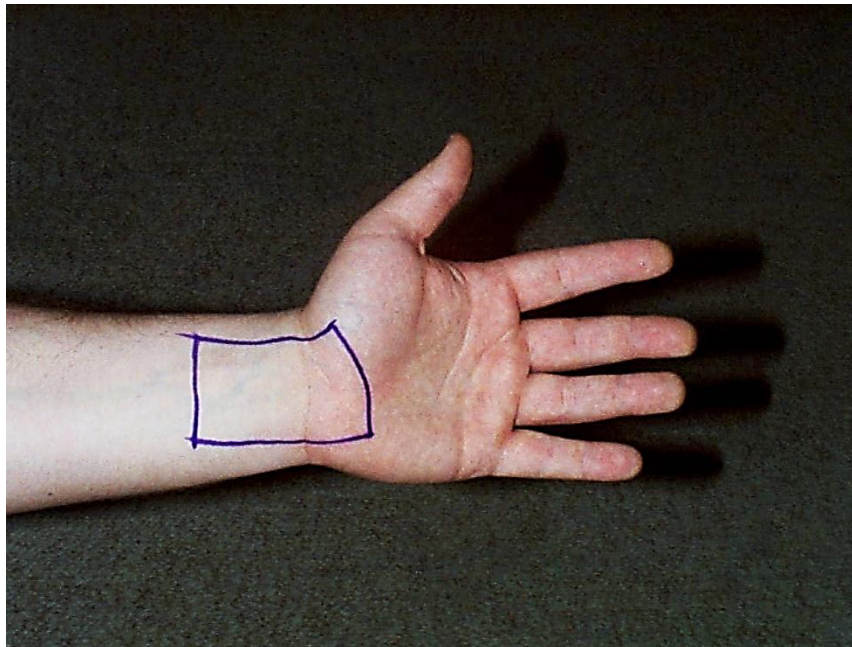


CARPAL TUNNEL SYNDROME

The median nerve and the long flexor tendons traverse the wrist through an arch formed by the carpal bones and the transverse carpal ligament, which spans the arch. The structure thus formed is called the **carpal tunnel**. Compression of the median nerve or its blood supply may occur within this inelastic tunnel from fibrosis (adhesion formation) of the flexor tendon sheaths. It may also arise from edema following a Colle's or Smith's fracture. A dislocated carpal bone, tumor formation within the tunnel, rheumatoid arthritis in associated joints, or swelling produced by tenosynovitis of the finger flexor tendons or sheaths within the tunnel may also produce compression. Should compression of the median nerve actually occur a common form of neuropathy might result which produces

symptomology collectively called the **carpal tunnel syndrome**. Motor weakness of the abductor pollicis brevis, opponens pollicis, flexor pollicis brevis, and the first and second lumbricals may result. Numbness, burning, and tingling in the first three digits may also occur. Cyanosis of the first three digits is a frequent symptom.

Symptoms of the **carpal tunnel syndrome** are noted to have the unusual trait of **ascending** the arm, thus imitating the cervical dorsal outlet or radiculitis syndromes. Symptoms most frequently occur or intensify at night or in the early morning, often waking the sufferer from sleep. Victims of this syndrome frequently complain of being "clumsy" with the involved hand and being prone to drop things.



The DSR zone associated with the Carpal Tunnel Syndrome

Objective evidence of **carpal tunnel syndrome** includes (1) loss of temperature, light touch and position sensations in the involved hand and fingers,

(2) insensitivity to pinprick in the index and middle finger, (3) increased paresthesia or numbness of the index and middle fingers when the wrist is forcefully

sustained in flexion or extension, (4) increased paresthesia or numbness of the index and middle fingers when manual compression is applied to the radial and ulnar arteries at the wrist, and (5) slowing of nerve conduction velocity distal to the wrist. If muscle atrophy in the hand is apparent (denoting severe or prolonged involvement), it is usually of the abductor pollicis brevis.

The **carpal tunnel syndrome** is generally thought (**by most medical practitioners**) to be a unilateral phenomenon, occupationally linked to jobs that require repetitive motion of the hands and wrists. It is specifically sited to be associated with repeated wrist dorsiflexion and simultaneous contraction of finger flexors. Victims commonly include butchers, assembly workers, and hand-workers in the sewing and knitting industry. **However**, the reality is that **the largest group of both unilateral and bilateral victims of the carpal tunnel syndrome is comprised of computer keyboard operators**. Victims are usually those who allow their wrists **to rest on the table**, or supporting surface, while utilizing a mouse (or trackball), or typing for extended periods of time.

The **carpal tunnel syndrome** occurs most frequently among women.

Treatment

Most **carpal tunnel syndrome** symptoms are produced from pressure resulting from swelling associated with inflammation of the tendons or tendon sheaths as they pass through the **carpal tunnel** (as demonstrated by differential skin resistance survey). That being the case, clinical efforts must be directed at reducing the inflammation process and any consequent swelling. Adhesions (fibrosis), produced as a result of the soft tissues being subjected to prolonged exposure to prostaglandins, must be eliminated. This must be accomplished (**without surgery**) with soft tissue manipulation for a complete and rapid elimination of the **carpal tunnel syndrome**.

Application:

- Preset an electrical stimulation unit to deliver a medium frequency current with a duty cycle of 10-seconds on and 10-seconds off. Place a negative electrode over the carpal tunnel and a positive over the wrist extensor muscles. Adjust the amplitude to

produce a near tetanic contraction of the forearm muscles. Electrically stimulate for 15 minutes. This procedure is designed to soften the adhesions (collagen fibrils) in preparation for the next step.

- Manipulate the soft tissues in and around the **carpal tunnel** to eliminate adhesions that may be present.
- Preset the ultrasound unit to deliver a 1 MHz pulsed waveform, at 1.5 W/cm². Ultrasound the inflamed zone, utilizing an effective non-steroidal anti-inflammatory as a coupling agent, for six minutes.
- Preset an electrical stimulation unit to deliver a 7 Hz, wide-pulsed galvanic current. A positive electrode should be placed over the **carpal tunnel** and a negative electrode over the wrist extensor muscles. The amplitude should be sufficient to produce visible rhythmic contractions. Stimulate for 20 minutes. This serves to help decrease swelling in the carpal tunnel as well as increase capillary circulation in the forearm.

The following treatment form has also proven to be effective.

- Preset the ultrasound unit to deliver a 1 MHz pulsed waveform, at 1.8 W/cm². Ultrasound the inflamed zone, utilizing an effective non-steroidal anti-inflammatory as a coupling agent, for six minutes. This procedure is designed to soften the adhesions that may be are present.
- Manipulate the tissues in and around the inflamed zone to eliminate any adhesions that may be present.
- Apply cold laser (with or without simultaneous electrical stimulation provided by the laser applicator) to the inflamed zone for approximately 6 minutes. This is performed to “cool off” the manipulated zone by effectively halting the production of prostaglandins (or facilitating enzyme destruction of **all** of the inflammatories being produced) by the stressed tissues.

Generally, this treatment provides almost immediate relief of the **carpal tunnel syndrome**, usually requiring only one or two sessions for full resolution, if the previous sufferer is able to avoid the causes of the problem.

If the **carpal tunnel syndrome** is caused by activities that require prolonged wrist dorsiflexion and simultaneous finger flexion (gripping), and is not caused by space-occupying lesions or masses, the patient is best served by having the wrist **soft-splinted** in the neutral ranges, with a wrist **soft-wrap** that permits free finger function but limits extreme wrist motion (a **neoprene universal wrist wrap** is highly recommended).

Hard splinting of the type that supports the wrist on the palmar surface with a "metal spoon" or other platform should be **avoided**. This type of splint may direct constant pressure into the **carpal tunnel** as the patient unconsciously fights the support to perform finger function, thereby compounding the problem.

If the **carpal tunnel syndrome** was caused by having the wrist on the table while typing on a computer board or using the mouse, the patient should be given the instruction: "**Do not keep the wrists on the table while performing computer functions.**" A quick solution is to place the keyboard on the edge of the supporting surface so that the wrists can't touch the table; alternatively, the forearm can be supported by a gel-pad proximally to the **carpal tunnel** (the same applies to "mouse work").

Trigger Points

The following trigger point formations with their referred pain patterns may, singly or in combination, imitate or contribute to the pain associated with the **carpal tunnel syndrome**: Scalenus, Infraspinatus, Latissimus dorsi (upper portion), Serratus posterior superior, Serratus anterior, Subclavius, Subscapularis, Pectoralis major (sternal portion), Pectoralis minor, Medial triceps (deep fibers), Brachialis, Middle finger extensor, Palmaris longus, Flexor carpi radialis, Flexor carpi ulnaris, Brachioradialis, Pronator teres, Flexor digitorum sublimis (radial head), Flexor digitorum sublimis

(humeral head), Flexor pollicis longus, Opponens pollicis, Adductor pollicis, and First dorsal interosseus.



A commercially available wrist wrap suitable as an adjunct to Carpal Tunnel Syndrome treatment



A "hard splint" with a metal spoon over the Carpal Tunnel and completely unsuitable as a treatment aid for the Carpal Tunnel Syndrome