
Loss of hand function can be a frightening experience. Whether it is pounding a hammer, playing the piano, using a computer or transferring from wheelchair to bed, the hand is an integral part of what makes us human.

Carpal tunnel syndrome, a painful hand and wrist injury resulting from repetitive motions such as typing on a computer keyboard, can prevent people from engaging in activities integral to their livelihood and lifestyle. CTS, which may result from compression of the median nerve at the wrist, is the most common nerve entrapment in the upper extremity that interferes with hand function. In the last few years, hand therapists have seen the number of cases of carpal tunnel syndrome skyrocket, and people with disabilities are not excluded from getting CTS. Left untreated, CTS may cause serious occupational and health problems.
CTS Symptoms and Treatment

Symptoms of CTS are usually unilateral, but both hands can be affected. The usual signs and symptoms of CTS are pain, burning, weakness, numbness and tingling affecting the thumb, index and middle fingers and radial aspect of the ring finger. Symptoms tend to increase with repetitive motions of the hand or wrist, especially with grasping, twisting, flexing and extending. Symptoms may also increase at night due to prolonged position of the wrist in flexion.

Splinting can be a highly effective treatment for acute CTS or patients experiencing symptoms only at night. If symptoms have been present at the acute stage for less than three months, conservative treatment usually begins with fabrication or provision of a wrist cock-up splint that maintains 10 degrees of extension. Medication may also be prescribed by the physician to decrease inflammation and reduce pressure on the median nerve.

The wrist splint must be fitted by an experienced therapist with a good understanding of CTS and fitting principles, because all prefabricated splints are not suitable for these patients. The splint should fit snugly and be long enough to support two-thirds of the forearm to maintain the wrist in good position.

The space in the carpal tunnel is largest when the scaphoid and radius are in neutral alignment and the second metacarpal is in approximately 10 degrees of extension. If the second metacarpal is placed in 10 degrees of extension, the scaphoid is placed in 10 degrees of flexion, thereby decreasing the carpal tunnel space.

The angle of the metal stave of the prefabricated wrist cock-up splint must be reduced from 30 degrees to 10 degrees of extension before using the splint. When fitting prefabricated and fabricated splints, the palmar pieces should not restrict metacarpophalangeal flexion and should allow for full movement of the thumb.

Client Education

Almost all musculoskeletal injuries are caused by the cumulative effects of awkward posture and position, excessive force, high repetition, poor physical condition, direct pressure on nerves, vibration and cold. Usually, it is a combination of two or more of these factors. However, because of the slow onset and because there is no single injury, the condition is often ignored until the symptoms become extremely painful. At this point, the person usually sees a physician or is referred to a hand therapist.

Client education is a priority, and hand therapists should explain how the body works and how the injury affects the body’s functioning. Holding any single posture for too long can cause pain and fatigue. As muscles become overloaded, blood flow is reduced and pressure is increased in sensitive tissues surrounding the joints.
Clients should understand the fascia, the connective tissue that runs between the cells and is composed of elastin and collagen cells. The fascial system houses the sheath covering the body’s muscles and nerve supply. It can exert pressure of up to 2,000 pounds per square inch. Trauma to fascia causes tissue to tighten up and constrict the cardiovascular and nervous systems.

Compression of fascia inhibits the cell’s ability to fire and supply nutrients, blood and oxygen to the body’s organs and systems, which ultimately leads to cell death. The cells are literally being poisoned because there is no toxic waste removal. The result is pain, which is why the client contacts the hand therapist.

The site of the pain, however, is not usually the source of it. Typically, people feel pain at the end of a stress point, but the force causing the trauma is at the other end.

Striving for nonsurgical intervention, many hand therapists offer customized treatment using holistic principles and alternative therapies in conjunction with traditional modalities. In this approaches, the therapist looks at the whole body and musculoskeletal system first and then treats with therapeutic exercises and myofascial release, as well as TENS and relaxation techniques, among other modalities.

During hands-on treatment, I use myofascial release techniques for about 15 to 20 minutes, holding the pressure steady for one to two minutes in each area. This pressure, even pressure as light as the weight of a quarter, can elicit rather strange reactions. Clients often develop a bad taste in their mouths, have intestinal gas or have to go to the bathroom. The reason is tightening of the fascia creates a buildup of lactic acid, which, when released, causes these reactions. Sometimes the hand therapist can even feel liquid beneath the skin’s surface when exerting a light touch.

Most clients feel better after six to eight sessions and are ready to start a home exercise program that includes relaxation techniques. Clients should be encouraged to improve their lifestyle, drink plenty of pure water and eat healthy foods. They come back to the treatment center for periodic checkups.

Recent statistics indicate people who have one surgery for carpal tunnel or a related disorder are likely to have three to five more related surgeries within the next eight to 10 years if they continue in the same line of work. I estimate that alternative treatments can save between $5,000 and $10,000 per patient in reducing time off, modifying job duties, avoiding surgery and eliminating handling disability claims.

For example, a client came in after undergoing several surgeries for CTS and other nerve-compression syndromes on
Case Study

A recent client at the Stanford Health Services Hand Rehabilitation Clinic, Palo Alto, Calif., is a 29-year-old right-hand-dominant man with spina bifida and paraplegia. He uses a wheelchair and has independent mobility, but he has been complaining of pain in the right elbow and wrist for the past four months. He thinks he injured himself while lifting weights and practicing the shot put and discus during training for sporting events.

X-rays showed soft-tissue prominence at the tip of the olecranon. He had full range of motion in the arm but experienced pain in the elbow while extending and flexing his wrist. Initially, treatment consisted of providing him with a Bollinger’s elbow strap along with an epicondylitis strap to decrease the pain and avoid hyper-extension of the elbow.

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To prevent and avoid further injuries, we emphasize three elements-stretching, strengthening and proper wheelchair positioning. In the beginning, this client was treated with iontophoresis treatment followed by stretching exercises and ice. Once the pain subsided, we added exercises with high reps and low weights to improve endurance for muscles that support wheelchair posture, including the rotator cuff, the serratus and trapezious muscles. Once the client performed these correctly in the clinic, he was started on a home program, coming in at least every two weeks for checkups.

The client’s pain has decreased significantly. He also now has a good understanding of body mechanics and its applications in sports. He continues to use the Bollinger’s strap because it guides him to avoid hyper-extension at the elbow.

Prem Lalwani, O.T.R., C.H.T., is a clinical hand and upper extremity specialist at Stanford Health Services Hand Rehabilitation Clinic. He can be reached at 900 Blake Wilbur Drive, Room W1080, Palo Alto, CA 94304-2205; 415/723-1702.