Thoracic Outlet Syndrome, Carpal Tunnel Syndrome, and Massage Therapy: A Case Report

Wesley Bond

Abstract

Background: Thoracic outlet syndrome (TOS) is a condition caused by compression of nerves or blood vessels in the thoracic outlet. Symptoms are typically ipsilateral and include numbness, tingling, and burning sensations down the length of the affected arm. Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy, affecting approximately 3 to 6 percent of adults in the general population. CTS is defined as a disorder caused by compression at the wrist of the median nerve supplying the hand, causing numbness and tingling.

Objectives: To investigate the efficacy of massage therapy in the concurrent treatment of thoracic outlet syndrome and carpal tunnel syndrome.

Methods: A 53 year old female massage therapist was diagnosed with dual thoracic outlet syndrome and dual carpal tunnel syndrome. Massage therapy was administered twice weekly for 60 minutes over a 5 week period. Each 60 minute treatment included a 15 minute intake and postural assessment. Daily pain levels were recorded by the patient on daily visual analog scales (VAS). Mostly deep tissue, and some neuromuscular techniques were used.
Results: Overall pain levels and symptom prevalence were reduced with massage. Activities of daily living, particularly giving massages, were more tolerable for the patient at the end of this case study. The patient also reported an improvement in the quality of sleep she was getting.

Introduction

Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy, affecting approximately 3 to 6 percent of adults in the general population. (Cestia W) Prevalence varies by demographic characteristics, industry, and occupation. (Luckhaupt SE) CTS is defined as a disorder caused by compression at the wrist of the median nerve supplying the hand, causing numbness and tingling. Some common causes include: subluxation of the carpal bones, scar tissue, excessive pressure within the tunnel due to enlarged flexor tendons, abnormal tissue such as osteophytes of tumors, and excessive fluid retention. (Chaitow) Although the prevalence of bilateral symptoms is uncertain, one study in the United Kingdom reported bilateral symptoms in more than 50 percent of cases. (Bland) Unfortunately, in recent years, carpal tunnel syndrome has become a collective diagnosis for many hand and wrist problems without precise testing of median nerve dysfunction. (Chaitow) Some trigger point (TrP) sources can mimic the currently over diagnosed entity of carpal tunnel syndrome. (Travell) If true impingement within the canal is diagnosed surgical intervention may be necessary. This may include open release, which involves an incision of the carpal ligament to enlarge the tunnel, or endoscopic surgery. (Chaitow) There is scarce data on the long-
term efficacy of these surgical interventions.

Another less common neuropathy of the upper extremities is thoracic outlet syndrome (TOS). TOS was first described by Peet in 1956, defining it as compression of the neurovascular structures in the interscalene triangle. (Peet RM) Although TOS symptoms can be initiated by compromise of both neural and vascular structures, over 90 percent of all TOS cases are of neurogenic origin. (Gliedt J) The brachial plexus is composed of nerve roots C5 to C8 and T1 and provides innervation to the entire upper limb. (Rattray F) Possible entrapment sites of the brachial plexus in TOS cases include the interscalene triangle (anterior scalene syndrome), costoclavicular space (costoclavicular syndrome), and the coracopectoral tunnel (pectoralis minor syndrome). (Pratt) In some cases, the neurovascular bundle is compressed in more than one location. This situation is referred to as “double crush syndrome”. (Rattray F) Surgery to relieve compression yields mixed results with occasionally debilitating outcomes. (Hamm) Thorough clinical evaluation is necessary to accurately diagnose cases of TOS. The highly variable nature of both the symptoms experienced and the entrapment sites (let alone the causes of those entrapments), has made the definitive diagnosis of TOS very difficult. (Hamm) Postural assessment is important to determine the position of the patient’s head, shoulders, scapulae and arms in the seated and standing positions. (Gliedt J) Rounded shoulders, forward head posture, and depressed scapulae tend to increase tension loading on the brachial plexus. (Swift) Conservative medical treatment focuses on reducing shoulder protraction/medial rotation, freeing myofascial restrictions, reducing emotional stress, and strengthening supportive musculature. (Edgelow) A possible relationship between CTS and TOS was first noted by Lord and
Rosati in 1971(Robert E). It's interesting to note that in one study on TOS, CTS, ulnar neuropathy, and radial tunnel syndrome in nearly half of all cases the proximal neuropathy precedes the distal one. (Narakas AO) In another study of 60 cases of shoulder girdle compression, 25 percent of cases also had carpal tunnel compression. (Mumenthaler M) The goal of this study was to reduce numbness, pain, and tingling in the arms, shoulders, and hands of the patient.

Methods

Patient Profile

The client is a 53 year old, 5'4" 175lb female massage therapist. The patient believes her pain symptoms have stemmed from two motor vehicle accidents, the first being a head on collision in 1978, the second a rear end collision in 1986. However, her neurological symptoms did not seem to manifest until 2001, and she eventually received a diagnosis of TOS. The patient was able to keep the symptoms under control with chiropractic care and general neuromuscular techniques (NMT), until October of 2007 when she awoke with loss of use in her entire right arm. Magnetic resonance imaging (MRI) reports concluded a disk herniation at C5-6, and a severe herniation at C6-7, with 50% impingement into the spinal cord. After this diagnosis the patient began multiple therapies, continuing with chiropractic care and NMT, and adding acupuncture, physical therapy, infrared therapy, and Body Bridge therapy to her regime. In 2009 the patient requested another MRI that showed while the herniations were still present, the spinal cord was no longer being impinged. At that point she was
diagnosed with dual CTS and dual TOS, and continued her routine therapies. The patient experiences very intense intermittent burning, tingling, and numbness from the shoulder down to all digits of the hand, as well as a moderate amount of edema in both hands. The symptoms greatly reduce her quality of sleep, and clearly pose a problem in her work as a massage therapist, as well as her activities of daily living (ADL).

**Treatment Plan**

Treatment began with an initial interview followed by ten one-hour sessions spread over a 5 week period. Each session began with a postural assessment in which bony landmarks were palpated and recognized as either inferior / superior, anterior / posterior, or in agreement with its corresponding landmark on the other half of the body. For example, the clavicular heads of this particular patient were misaligned in the horizontal plane, showing a superior right clavicle. This measurement among many others such as the humeral heads, anterior superior iliac spine (ASIS), temporal bones of the cranium, and the greater trochanters of the femur were recorded on a chart if a discrepancy was found in any plane. Each session was focused on correcting the postural distortions shown by the chart; an integrative approach Suprina suggests is favorable in the treatment of chronic pain. (Suprina) Special attention was paid to distortions that may be contributing to the occlusion of the thoracic outlet, as well as treating musculature that may house trigger points (TrPs) that mimic her pain symptoms. The following tools were used in assessment, data collection, and treatment:
In the initial assessment, the patient presented with a large amount of medial rotation at the humerus. In order to rule out TrP pain as a cause of TOS and CTS symptoms (pseudothoracic outlet syndrome), the major internal rotators of the humerus were assessed and treated. Pseudothoracic outlet syndrome typically involves the pectorals major, latissimus dorsi, teres major, and subscapularis. The brachialis also has TrPs that imitate CTS. (Travell) Severe sensitivity was found in all of these muscles during the first treatment, with TrPs referring down the length of the arm. The latissimus and pectoralis major, were treated with compression and compression with opposition and the subscapularis was treated with cross-fiber and with-fiber friction strokes. The pectoralis minor was also treated with cross-fiber strokes. Though all of these muscles TrPs reproduced her pain patterns, the treatment produced no long lasting results.

During the next three sessions emphasis was placed on reducing the patients
thoracic kyphosis and forward head posture in order to reduce tensile strain on the brachial plexus. Because the distal portion of the brachial plexus passes deep to pectoralis minor where it attaches to the coracoid process, special attention was paid to this muscle’s examination in each session. (Travell) Additionally, the typical nerve entrapment sites of the forearm were assessed. Supinator and extensor carpi radialis brevis were examined for their ability to entrap the radial nerve. Flexor carpi ulnaris, flexor digitorum superficialis and profundus were assessed for ulnar nerve entrapment. Finally, pronator trees and flexor digitorum were examined for median nerve entrapment. (Chaitow) Though the tissue was significantly hypertonic, none of the patient’s typical pain patterns were reproduced during treatment of these muscles.

Once the coracopectoral tunnel was sufficiently decompressed without significant symptom relief, the focus moved on to opening the scalene triangle. A narrowing of the triangle through changes in the muscles or rib, or through space-occupying structures, often results in symptoms of compression of the nerves - specifically, the brachial plexus – or of the blood vessels – namely, the subclavian artery. (Szabo) The scalenes were treated bilaterally with longitudinal strokes as well TrP release protocol. The rib attachments were treated with cross fiber strokes. The anterior scalenes were found to be very hypertonic, and produced TrPs that radiated to the ipsilateral arm, hand, and shoulder. Middle and posterior scalenes produced similar results. The patient experienced a minimal amount of long lasting results from the release of these muscles.
It was not until the subclavius muscle was addressed that the patient had significant symptom reduction. Shortening of the subclavius muscle because of TrPs will draw the clavicle down toward the subclavian artery and vein as they pass over the first rib. In some patients this pressure can at least contribute to, if not cause, entrapment and the symptoms of a vascular thoracic outlet syndrome. (Travell) In order to reach the subclavius the patient was put into a side lying position, and with the right side on the table, the left arm was draped over the therapist's shoulder. The therapist actively protracted, and slightly elevated, the left shoulder of the patient in order to open the thoracic outlet and reach the subclavius muscle. Using a pincer compression around the clavicle, the subclavius was palpated and treated with static compression. This was by far the most sensitized muscle treated during this case, and reproduced the patient's typical pain pattern. The next day the patient noted that she experienced no numbness while giving 6 1-hour massages at work, although the burning sensation down the arms was still intermittent.

**Results:**

Treatments 1-6 yielded minimal long-term results in regards to symptomology, though the patient noted having slightly improved range of motion in the cervical spine as well as the shoulder girdle. Gradual improvement in daily pain levels and symptom intensity was seen during the course of treatment. The most substantial change was seen after the 6th treatment, which seemed to stem from the release of the subclavius muscle. The patient noted that the day after this treatment she experienced her first full day of work
without numbness in her hands, as well as her first uninterrupted night’s sleep since the manifestation of her current symptoms. Though the daily VAS results were very sporadic, (Figure 1) it showed a somewhat steady decline in pain levels. A 3 point reduction on the DASH (Disability of the Arm, Shoulder, and Hand) questionnaire was also noted (Figure 2).

**Conclusion**

Further research needs to be conducted to determine the effectiveness of massage therapy in the treatment of thoracic outlet syndrome and carpal tunnel syndrome. **Acknowledgements**

I'd like to thank our clinic supervisor Randy Clark, as well as the entire staff and student body at the Center for Neurosomatic Studies.

**Figure 1.**
References:

KIM EDWARD LeBLANC, MD, PhD, and WAYNE CESTIA, MD, Louisiana State University Health Sciences Center, New Orleans, *Louisiana Am Fam Physician*. 2011 Apr 15;83(8):952-958.


Jordan A. Gliedt, D.C. Clinton J. Daniels, D.C., M.S. Dennis E. Enix, DC, MBA

Neal Pratt, PhD, PT. *Anatomy of Nerve Entrapment Sites in the Upper Quarter*. J HAND THER. 2005;18:216–229


