Clinical Case Report Competition

WCCMT Victoria

August 2014

Third Place Winner

Sheila Sloman

Massage therapy and the management of pain and neurological symptoms associated with a cervical compression fracture
ACKNOWLEDGEMENTS

Colleen Pritchard, my case presentation supervisor. Many thanks for the support, guidance and therapeutic expertise you instilled. Gratitude for the support and therapeutic expertise also offered by Renata Brandes, instructor and clinic supervisor. The hands-on instruction with the deeper cervical massage techniques and encouragement to be confident and creative, to use paraffin in the hydrotherapy treatments, is much appreciated.

ABSTRACT

The objective for this study was to assess the effectiveness of Massage Therapy techniques for the management of pain and symptoms associated with an 8-year-old undiagnosed, untreated cervical compression fracture, further compounded with unilateral neurological symptoms resulting from a motor vehicle injury. Once a week for 8 weeks, the client used no other modalities nor methods for pain relief except for the 70 minute massage therapy sessions and the homecare given by the therapist. Initial neurological and muscular testing showed substantial weakness in the left arm and forearm, as well as the neck muscles Sternocleidomastoid, Longus Colli and the Scalenes. Cervical Range of Motion was negatively affected on the left side as well, primarily in rotation and lateral flexion. Cervical ranges of motion and hand dynamometer readings testing isometric hand/forearm strength were recorded at each treatment. Neurological and muscular testing occurred on the first and final treatments only. On the 8th treatment final examinations determined the muscle strengths were all normal, cervical range of motion had increased to 100% mobility, and headache occurrence, numbness and tingling of the left arm and hand, completely disappeared. Massage therapy is indicated for whiplash victims who suffer with chronic neck pain. Even though injuries may go
undiagnosed and untreated, there is still relief available through the skilled hands of a trained massage therapist.

**KEY WORDS:** Massage Therapy, Cervical Compression Fracture, Unilateral Neurological Symptoms, Hydrotherapy, Myofascial, Trigger Point, Whiplash, Dynamometer, Paraffin.
**INTRODUCTION**

The cervical spine is the most complicated articular system in the body, composed of 37 separate joints and 6 intervertebral disks (McKechnie, 2010). McKechnie (2010) relates the following information—whether asleep or awake, the normal cervical spine moves up to 600 times per hour. Cervical stability is sacrificed for mobility, and so this incredibly complicated structure is more prone to injury. Gross, Goldsmith, Hoving, Haines, Peloso, Aker, Santaguida and Myers (2006) relate that neck pain is a major contributor to disability issues worldwide, with approximately 70% of people having experienced neck pain at some point, and 15% experience chronic neck pain.

A certain amount of cervical disk degeneration is a normal occurrence in the aging process, however, daily repetitive movements can exacerbate this issue, and people begin to experience more discomfort, increased loss of cervical ROM, decreased strength of postural muscles, cervical muscle fatigue, radicular symptoms and general stiffness (Avery, 2012).

Compression injuries to the cervical vertebral disks can also negatively affect surrounding tissues and structures. Compressions to nervous tissue in the cervical area most often results in pain being experienced in the neck, upper back or arm and as McKechnie (2010) explains, in rare situations this pain can be accompanied by changes in sensation and weakness in one arm, suggesting nerve root compression. The most severe injuries and greatest wear and tear occur between C4 and C7, the nerve roots that pass through the intervertebral foramen in these areas are C5, 6 and 7 (Zacharia and Anderson, 2013). Zacharia and Anderson (2013) detail the muscles innervated by those specific nerve roots—C5/6 nerve roots supply the Deltoid, Biceps,
Brachioradialis, Infraspinatus and Supraspinatus muscles; C6/7 supplies Pronator Teres and Flexor Carpi Ulnaris; C7 innervates Triceps and Latissimus Dorsi; C7/8 supply the wrist flexors and extensors.

Although intervertebral disc herniation and degeneration due to aging are the most common sources of compression radiculopathies, McKechnie (2010), believes that most cervical disk syndromes are likely caused by injuries that involve hyperextension, resulting in the compression of anatomical structures. This injury often occurs as a result of motor vehicle accidents. Whiplash (acceleration or deceleration of the head and neck relative to the body) occurs from many different means, sports and diving accidents for example, but motor vehicle accidents are responsible for the majority of whiplash injuries (Insurance Corporation of British Columbia, 2013). Between 2008 and 2013 the Insurance Corporation of British Columbia (2013) stated the annual average number of people involved in crashes resulting in an injury or fatality in the province was 51,000.

Whether an impact is from the rear, side or front, muscular tissues and structures in the neck are going to be influenced in some way. Cervical and thoracic vertebrae, intervertebral disks, facet joints, ligaments, fascia, nerve roots and the spinal cord may all be affected in a whiplash injury, and all the associated cervical and thoracic musculature (Rattray and Ludwig, 2000). Rattray and Ludwig (2000) go on to explain that in acute whiplash injuries of a Grade 2 or higher, muscles of the neck including sternocleidomastoid, scalenes, infra/suprahyoids, posterior cervical muscles and longus colli may suffer spasms, strains and contusions. In Grade 4 or 5 injuries, rupture of the PLL and ALL ligaments may occur, as well as facet dislocations and vertebral fractures (Rattray and Ludwig, 2000).
Although there is some literature available that has documented treatments and issues related to cervical spine and disk injuries, the majority of the articles relate primarily to the use of physiotherapy, chiropractic and medical intervention. Little research is available on the sole effects of massage on these issues.

The objectives of this case study are to promote the effectiveness of massage therapy in the treatment of cervical injuries, even those left untreated. This case study aspires to not only give clients suffering with neck pain more non-invasive treatment options for relief, but to further increase the value of massage therapy in the eyes of other medical and professional therapists.

**CLIENT PROFILE**
The participant in this case study was a 25 year old female. She is a full-time bartender and her job is extremely physical, requiring a lot of heavy lifting. While off-roading in June of 2005, the subject’s vehicle skidded off the road and flipped several times before landing on the roof. She was suspended upside down by her seat belt, when a bystander, trying to get her out, undid the belt and the subject landed on her head. She was knocked out momentarily and came to lying on her side. The first thing she remembers after gaining consciousness is that her left arm felt numb and then started aching. The subject walked several miles home and she spent several days in bed, suffering with headaches and neck stiffness. She never sought any medical treatment nor any other therapy; she has experienced aching/weakness in her left arm, chronic neck pain and frequent headaches (3-7 x week) ever since the accident.

The subject tended to ignore her discomfort and handled it primarily with NSAIDs if they began to interfere with her lifestyle. In September 2013, as she was running outside to attend to her
dog, she ran head first into an overhanging board on her patio deck and was knocked out. She was unsure of how long she was unconscious, since no witnesses were present. In the days that followed, the subject began to experience more frequent, intense headaches, increased neck and shoulder pain, and more weakness in her left arm.

In the first meeting between the author and subject, the subject was extremely concerned that her condition was getting worse; she does not want to rely on NSAIDs nor experience any further electro physical assessments (done by a neurologist) because of the intensity of the pain they provoked. She is physically fit, and although the bartending job is extremely demanding physically, the subject is happy in her life. She is extremely dedicated to improving her overall physical condition and was both receptive and committed to all the techniques employed and the exercises and stretches the author suggested for her homecare.

The subject expressed her frustration with the medical system. Not from this area, she has been unable to find her own family doctor. She has had to go to walk-in clinics for any medical attention and she feels that because of this, no one was getting to know neither her nor her situation and she believed she would never get any real intervention for her neck issues. The subject confided that none of the medical professionals she met with offered her any helpful advice or treatment options and a few were quite insensitive to her situation. She began feeling depressed and hopeless that she would never find pain relief or anyone who really cared.
Examinations and Prior Treatment
A chiropractor was consulted after the incident on the patio and X-rays were taken. The concluding report indicated that degenerative changes were noticeable at C1/C2, there was an old compression fracture of C6 with disk injury at C6/7, and a slight kyphosis of 4.4° at her cervical spine.

An MRI was also completed in October 2013 - the subject became alarmed and went to the hospital because she could not lift her left arm. The results of the imaging were processed by a neurologist, who confirmed the straightening of the cervical lordosis and compression of the C6 vertebral body with inferior endplate sclerosis, supporting the evidence of an old fracture. The MRI also revealed a mild disc bulge and disc height loss at C6-7, as well as spondyloarthropathy in the area.

The neurologist conducted an electrophysiological evaluation on deltoïd, biceps, triceps, extensor digitorum, pronator teres and the first dorsal interosseous muscles, all of which were determined to be normal. However, the left lateral forearm and the volar (anterior) surfaces of the left thumb, index and middle fingers all showed either decreased touch or pinprick sensation. Left ulnar and median motor and sensory nerve conduction studies showed normal. No further options for treatment were given.

TREATMENT PLAN
After reviewing the medical documentation, an introductory meeting with the subject was set up to discuss treatment goals and options, as well as explaining the requirements for being a case presentation participant. Therapeutic massage treatment protocol was designed and
implemented to focus on the subject’s neck and shoulder pain and neurological disturbances that affected her left arm.

The baseline for the subject’s assessment was created during the initial treatment. Cervical ranges of motion (ROM) were recorded with a goniometer during the initial and final visits. Bilateral glenohumeral ranges of motion were all performed perfectly in the initial assessment; the client confirmed these movements have never been an issue for her, therefore the author decided to focus exclusively on improving the cervical spine ROM. Visual cervical ROM assessments were tracked every treatment, but the author chose to record and plot the goniometric data from the first and final assessments only.

Manual muscle tests were completed on neck, shoulder and arm musculature on the initial and final assessments; scores were based on the Muscle Test Grading Scale 0 to 5 (McGee, 2008). Muscles tested were deltoid, brachialis, coracobrachialis, biceps brachii, sternocleidomastoid, longus colli, anterior, middle and posterior scalenes, rhomboids and levator scapula. The cervical muscles are the focus of this investigation based on research that has actively demonstrated whiplash injuries affect cervical musculature especially sternocleidomastoid, scalenes, posterior cervical muscles and longus colli (Rattray and Ludwig, 2000) The special tests chosen were looking for nerve entrapment, cervical or brachial plexus irritation and signs of Thoracic Outlet Syndrome. Upper Limb Tension Tests 1-4 resulted in positive for tests 1 and 2 (median nerve common to both tests). Roos test scored positive with increased numbness and tingling on the left compared to the right side. Allen’s, Adson’s and Halstead’s tests were all negative.

The subject complained of overall left arm and hand weakness, therefore the author chose to use an Electronic Hand Dynamometer to monitor general changes in maximum isometric
strength in forearms and hands. The client held the dynamometer in the hand to be tested, with the arm at right angles and the elbow by the side of the body. The handle was adjusted so the base would rest comfortably on the metacarpals and the handle would rest in middle of the proximal phalanges. The subject would squeeze the dynamometer with maximum isometric effort and maintains this for 3-5 seconds. The highest pressure was displayed digitally and recorded. Then the meter was switched to the other hand. In 5 treatments, three readings per hand were taken and the average readings for both hands were plotted.

The massage techniques employed included Myofascial and Thoracic Inlet Release, General Swedish Massage, Trigger Point Release and Hydrotherapy.

The client received nine sixty-minute treatments once a week for nine weeks. The second, fourth and sixth treatments began with a paraffin application to the posterior and lateral cervical areas. The therapist chose to add this treatment because paraffin treatments have been used in physical therapy since 1917 to help heat to penetrate tissues for advanced healing (Sinclair, 2008). The treated areas were covered with a towel and a thermaphore (set at 20°C) was positioned to keep the area heated. The application stayed on for 15 minutes while a Thoracic Inlet Release was done as a fascial release technique. The thoracic inlet is one of three very important fascial transverse planes and can be an area of major dysfunction (Barnes, 1990). The subject was positioned supine; one of the therapist's hands was placed under the cervicothoracic junction covering C7-T2 and the other was placed on the anterosuperior thoracic wall, covering sternoclavicular joints, the suprasternal notch and the upper costochondral junctions (Barnes, 1990).
The paraffin was removed and gentle longitudinal stripping was done of the scalenes and longus colli. Bilaterally, the sternocleidomastoids were felt to be quite adhered to underlying tissues and so the muscles were gently picked up and rolled between the therapist’s thumb and fingers, clavicular and sternal fibres were stripped, cross fibre frictions were done at the origins and attachments; trigger points were released. All areas were flushed out thoroughly. The total time spent on the cervical muscles in these treatments was 30-40 minutes; a minimum of 15 minutes per side. A minimum of 10 minutes was saved at the end of every treatment so some gentle cervical traction could be administered (Ojoawo, Olabode, Esan, Badur, Odejide and Arilewola, 20, 2013). As well as an occipital condyle release, more intense myofascial cervical stretches were used to increase the client’s bilateral side bending and rotation (Barnes, 1990).

After the 3rd treatment with paraffin, it was the author’s decision to eliminate it from the treatments (mainly due to time constraints) and focus on the other techniques.

In the non-paraffin treatments, the client was positioned prone and general Swedish massage techniques were used to warm up the tissues. Longitudinal stripping, thumb kneading, skin rolling, cross fibre frictions and muscle stripping were techniques used on restricted tissues found in upper and middle trapezius muscles, levator scapula, rhomboids and erector spinae. After 15 minutes, the client would be positioned supine and the cervical treatment outlined above was performed. Five minutes was left at the end of each treatment to check in with the client, do a cervical ROM and go through homecare.

Homecare started out with gentle cervical stretches for all ranges of motion and then progressed to the client adding slight resistance with her hand. She was encouraged to hold each stretch for 15 to 20 seconds, 3 repetitions, 3 to 4 times a day, as long as there was no pain
or discomfort. By the 4th treatment, contract-relax techniques were added for the cervical spine strengthening; Flexion, extension, rotation and side bending positions were to be held for 5 seconds, 3-4 times a day.

The client was encouraged to monitor her posture at work; to squat and lift with her legs and to use her right hand more frequently, as she admitted that she tended to overuse her left hand for pouring beverages and carrying trays.

**RESULTS**

Progress was monitored at the beginning and end of each treatment via the therapist’s palpation skills, visual assessments and from client feedback. Hand dynamometer data showed a bilateral increase in strength as shown in Figure 3.

Cervical spine ranges of motion (measured with the goniometer in the first and final treatments) showed increases as well, especially in left lateral flexion and left rotation (Figure 1). Compared to initial assessments, final manual muscle testing showed increased strength, as plotted in Figure 3. Increased stability was evident during the muscle testing and the subject’s verbal feedback confirmed that her neck felt much stronger and although neural symptoms and left arm weakness were not gone completely, in her opinion, they had significantly diminished from the time of our initial assessment.

Upper Limb Tension Tests 1 to 4 were all negative, and although the client still tested positive for Roos test, she was able to maintain the position for twice as long and the numbness and tingling that was in her left arm in the initial test had diminished.
Figure 1. The change in the subject’s active range of motion at the cervical spine.
Figure 2. Hand Dynamometer Reading Comparison
Figure 3. Manual Muscle Testing Changes from Initial to Final Assessment.

* For simplification the author chose to include only those muscle tests which graded less than 5 on the scale, either on the initial and/or final assessment.
DISCUSSION

Neck pain is a common health problem and although there are many more options available these days which attempt to alleviate this discomfort, there is little solid evidence to guide therapists and patients as to which are the most effective (Sherman et al. 2009). Although chronic symptoms may not affect physical health, younger patients (<40 yoa) are shown to experience increased negative impacts on mental health when dealing with combined neck and arm pain than either symptom alone (Daffner, Hilibrand, Hanscom, Brislin, Vaccaro and Albert, 2003). Daffner et al. (2003) explains that although low back pain has received more financial and social emphasis, the disability caused by neck and arm pain is just as substantial a burden and has a major impact on those whose lives are affected by this condition.

My client experienced this personally. She expressed her relief and her gratitude in our final assessment for being able to become a case participant because she had finally found someone who truly cared about her situation, became familiar with her signs and symptoms and took the time to understand what she was going through, both physically and mentally (see Addendum). Apart from finding pain relief, she also expressed how much it meant to her that she had so much more clarity as to what was happening in her body and what her treatment options were.

The treatment outcomes in this case study was extremely positive. For the first time in years, the client’s tension headaches completely dissipated and cervical ranges of motion were returning to normal (Figure 1). The strength in arms and hands increased bilaterally over the 9 weeks of treatments as well (Figure 2). The cervical musculature showed improved strength over the course of the treatments, as shown in Figure 3. Gentle nerve flossing in Upper Limb Tension Test positions 1 and 2 were done during the treatment March 18th. However, having
just learned this technique earlier that week the therapist was not fully confident in her skills to continue, and decided to stay with the original treatment protocol.

It appears that the addition of massage therapy has had profound positive effects on this client’s symptoms and overall well-being. The results from this study show strong support for the value of massage therapy. Massage treatment plans in combination with specific therapeutic exercises for homecare may help to decrease or even eliminate cervical pain and associated neurological symptoms. It also gives clients other safe and nonsurgical and non-invasive treatment options.

Additional studies, especially on larger cohorts, would be most beneficial to further support the results from this practical study.
Addendum: Below is a handwritten letter given to the therapist from the client.

When I came into the Victoria College of Massage Therapy as a case study, I was suffering a lot of discomfort.

I had chronic pain in my neck & shoulders, tension headaches, trouble managing stress, weakness and re-occurring numbness in my left arm & hand, a stiff neck... and that's just to name a few!

I found out that I had an old C6 compression fracture (stable) from 8 years ago (about 8 months before my first visit with Sheila). I had countless doctors' appointments, specialist appointments, MRI's & CT scans to get to the bottom on my injury's effect on my nerves and how it contributed to my numbness, weakness. They couldn't figure it out, so they eventually told me it was something I needed to "wait out".

Coming in to the college was my best decision. Sheila was very caring, extremely professional and a great massageuse. She got to the bottom of some things that doctors couldn't figure out. I only saw her for just a couple months and she relieved me of some symptoms that ->
I had been experiencing for years.

my pain and discomfort were at an all time low, I find myself more relaxed, my numbness and weakness is much less frequent (rarely occurring) ... and I never have headaches anymore!

Although Sheila was able to help me with all of those things, to me the greatest gift was her attentiveness and caring. She took the time to learn my body and help it heal while teaching me a thing or two. That’s something I didn’t even receive from medical doctors.

I want to thank the college and especially Sheila for the great work!

Thank - You!
REFERENCES


