



Clinical Case Report Competition

WCCMT Victoria

August 2014

Second Place Winner

Melanie Mrus

Can massage therapy help a patient with chronic pain
break the pain tension cycle?

Acknowledgements

I would like to thank my client for volunteering to be my case study. Without her I would not have learned as much as I have throughout this project. Also, Mark Strudwick, my clinical case advisor, for his support along the way. Matthew Fleet, thank you, for always being kind with great ideas and positivity.

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Abstract

A client diagnosed with myofascial pain syndrome (MPS) was treated to break the pain tension cycle. Chronic pain, whiplash associated disorder (WAD) symptoms such as tinnitus, headache, dizziness, neck, and back pain was treated. It was discovered that choosing techniques to treat the anterior muscles of the neck were most beneficial in treating these symptoms. The fear of movement and pain tension cycle was the main focus of this study to help the patient become more active and able to return to work. Questionnaires, orthopedic testing, manual muscle testing, as well as range of motion were measures taken to quantify subjective pain and discomfort levels to strategically and professionally build a treatment plan. In all testing results, the client's symptoms had decreased and an open communication relationship was established throughout the course of the 12 treatments. It was concluded that intense techniques followed by flushing of the area seemed to be the client's preference for treatment. These techniques as well as listening to the client's needs and point of view helped the therapist make professional decisions aiding the treatment protocol. The pain tension cycle was directly addressed as well as physical symptoms. A strong therapeutic relationship was built.

Keywords: pain tension cycle, myofascial pain syndrome, chronic pain, whiplash associated disorders.

Can Massage Therapy Help a Patient With Chronic Pain Break the Pain Tension Cycle?

Introduction

Myofascial pain syndrome (MPS) is a musculoskeletal disorder characterized by easily palpable taut bands in muscle called trigger points, usually with associated trigger point referral patterns (Gerwin, 2001). Gerwin also says MPS is often compared to, and confused with Fibromyalgia. MPS may result from an acute strain caused by a sudden overload or overstretching of the muscle.” (Hertling & Kessler 2006). “Travell believed a taut band may be a contracture of muscle fibers that were damaged in the trauma that initiated the trigger point” (Rattray & Ludwig, 2005). According to Gerwin (2001), there are two classifications of MPS: Primary and Secondary. He states that primary MPS can be headaches, pain or symptoms are not related to any other medical condition, while secondary MPS is related to other medical conditions such as chronic cervical whiplash neck pain, temporomandibular joint (TMJ) dysfunction, soft tissue damage as well as many other pathologies. Rattray and Ludwig (2005) state that symptoms of trigger points can be misdiagnosed as psychosomatic, which can be frustrating for the client. Treating the underlying lesion, in MPS, is the most important strategy. “If the underlying lesion is not correctly treated MPS will not subside,” according to Hong (2006).

“Whiplash is an acceleration-deceleration injury to the head and neck” (Rattray & Ludwig, 2005). Rattray and Ludwig (2005) discuss that the tissues involved in whiplash are structures of the upper thorax, neck and head including joints, blood vessels, fascia, ligaments. Muscles of mastication, posterior, anterior, and lateral muscles of the neck, muscles of the thorax including intercostal muscles and diaphragm may all be affected. Chronic cervical whiplash and whiplash associated disorders (WAD) such as TMJ disorders, blurry vision, vertigo, fibromyalgia syndrome, myofascial pain syndrome, thoracic outlet syndrome (TOS), tinnitus,

neck and back pain (Hertling & Kessler, 2006). Hertling and Kessler also state the client will present with deep aching pain in the head, shoulders and neck. The client will also present with a headache originating from the suboccipital area, hypertrophied sternocleidomastoid (SCM) muscles, and hyperactive anterior neck muscles and muscles of mastication (Hertling and Kessler, 2006). “Large muscles groups have healed but they may be shortened and fibrotic. The longus colli may remain in chronic spasm and be acutely tender to palpation. The longus colli exerts a force that gradually flattens the cervical spine and may lead eventually to cervical instability. The multifidi at the C5 or C6 segment will be in constant contraction and may feel rubbery and inflamed as a result of overwork, in an attempt to stabilize the lower spine.” (Hertling & Kessler, 2006, p.736). “A hyperkyphotic posture can perpetuate dysfunctional movement, scarring, ischemia, and fibrous taut bands in the musculature of the neck” (Rattray & Ludwig, 2005 p.386, 387).

Other important factors to address are the psychological perpetuating factors relating to the pain-tension cycle in patients with chronic pain. Pain and stress lead to tense muscles, tense muscles cause pain and stress. Pain and stress add to the pain the client already feels which leads to more muscle tension and stress (Newton-John, 2005). Two major contributors to the pain tension cycle along with environmental, emotional and physical stressors are avoidance and misinformation. Avoidance, according to Newton-John (2005), is described as a patient that avoids any movement or activity that might cause pain. Inactivity in the client suffering from chronic pain perpetuates loss of strength and flexibility. During these stages of inactivity, with spurts of normal activity, pain flare-ups can occur. These pain flare ups reinforce avoiding an activity in order to avoid pain (Newton-John, 2005). Avoidance gradually decreases the amount of time the patient is active, reinforcing the fear of movement and continuing the pain-tension

cycle. This fear of movement is termed kinesiophobia (Vlaeyen, Kole-Snijders, Boeren, & Eek, 1995).

Newton-John (2005) states, “Chronic pain treatment involves education about the relationship between pain and damage, influence of posture and biomechanics on muscle fatigue, and the role of central hypersensitivity in the maintenance of ongoing pain.” This type of education must be made early on so it can be corrected. If the client can learn how much they can physically do before pain starts, and stop the activity before overexertion, then they can avoid flare-ups. By avoiding flare ups, they are becoming active again without sporadic pain, thus becoming less afraid of movement, and stepping away from disability (Vlaeyen et al., 1995). In treating the pain tension cycle it is very important to note the words as stated by Janet Travell (1999), “Clinicians must believe that their patients hurt as much and in the way that they say they do.” Can massage therapy help a patient, with previously diagnosed myofascial pain syndrome suffering from whiplash associated disorders, break the pain tension cycle?

Methods

Patient History

The patient is a 40 year old, Caucasian female. She has been living with tension and pain in her back and neck for nine years. She does not take any prescribed medications but does take over the counter anti-inflammatories when needed. The client was diagnosed with Myofascial Pain Syndrome (MFS) in 2010. She suffers from daily tinnitus, bruxism, headache, dizziness, and muscular pain in the cervical spine (CS), subscapular and pectoral regions. She has had two acceleration deceleration injuries: the first in September of 2004, falling from a horse landing with her back and neck in extension, the second in May of 2005, falling from a bicycle. These two accidents occurred relatively close together with the latter increasing the intensity of chronic

pain symptoms. The client became pregnant in 2012 and is presently breastfeeding, developing a head forward posture. She is concerned about her shoulders rolling forward as time goes on. Although whiplash has never been diagnosed, WAD symptoms, especially tinnitus, were the focus of treatments 1- 4. These symptoms were the client's main concerns at the start of the case study.

The patient has been to many healthcare professionals seeking relief from varied pain intervention strategies including: massage therapy, chiropractic, neurological assessments, inner ear assessments and most recently Intramuscular Stimulation (IMS) saline solution injections. The client received these injections January 12, two weeks prior to volunteering for this study, and February 22nd, prior to treatment 6. The solution was injected by needle into scalene, quadratus lumborum, erector spinae, pectoralis major, pectoralis minor, and trapezius muscles.

These extensive healthcare visits have led to an extensive and overwhelming home care regime. Visits to many healthcare professionals can be one factor in perpetuating inactivity, strengthening the pain tension cycle (Newton, 2005).

Some activities of daily living include housework, cleaning, changing diapers, nursing, playing with and keeping up to a toddler, working at a computer and walking. These activities as well as chronic pain, interrupted sleeping routines, headaches, tinnitus, dizziness, vertigo and an extensive home care routine previously prescribed by other health care professionals, are also major stressors in her life. Previous to injury, the client was quite active. She stated by email that she believes her activity level is directly related to her pain level (See Appendix A). This statement is one example of kinesiophobia prolonging the pain tension cycle (Newton-John, 2005).

Treatment

The client was treated in the student clinic at West Coast College of Massage Therapy at the Victoria campus. All treatments were 70 minutes in length, including interview, orthopedic testing, manual muscle testing, range of motion testing (ROM), treatment, reassessment and homecare. The client volunteered from the community to be part of the case study. A consent form and health history form were signed and filled out. The client had received 12 treatments from January 26th – March 31st. The treatments were scheduled according to availability in the intern clinic. Sessions were held once or twice per week sometimes with two weeks in between. One treatment per week would have been ideal for this patient. Each treatment focused on breaking the pain tension cycle while treating WAD symptoms in the upper back, chest, neck and head.

Assessment: For description of assessment tools see Appendix B.

Cervical ROM was completed to track the progress of each session. On her own time, the client completed the Neck Disability Index Questionnaire (Vernon & Mior, 1991), and the Tinnitus Handicap Inventory Questionnaire (McCombe, A., Bagueley, D., Coles, R., McKenna, L., McKinney, C. & Windle-Taylor, P., 2001) to track progress and level of disabling effect MPS and WAD symptoms over the duration of the case study. During each treatment verbal, visual, muscle tests and orthopedic tests were completed. Figure 1 shows the assessment name and when it was used. It should be noted that the Maximum Cervical Compression Test was performed without compression (See appendix B). Upon checking in with the patient, compression on the CS was against her wishes. Along with orthopedic testing, and CS ROM, manual muscle testing was an important segment of the assessment. It is also important to note that the SCM manual muscle test was modified. The patient did not feel safe lifting her head off

the table. She felt that this test was unnecessary and in treatments 11 and 12 refused the modified version (See Appendix A and B). Post treatment, all positive orthopedic and manual muscle tests were retested.

Assessment Tool	Treatment Applied
CS ROM	All
Neck Disability Index (NDI)	1, 5 and 10
Tinnitus Handicap Inventory (THI)	1, 5 and 10
Orthopedic Tests	
Functional Opening Test	All
Lateral Deviation of the Jaw	All
Cervical Myotomes	1, 6, 8, and 10
Vertebral Artery Test	1 and 10
Upper Limb Tension Test One (ULTT1)	1, 10 and 12
Maximum Cervical Compression Test	1, 4, 5, 8, 10 and 12
Manual Muscle Testing	
Scalenes	1, 3-12
Sternocleidomastoid – Modified	1 - 10
Trapezius – upper, middle and lower	1-4, 6-12
Deltoid	1, 10, 12
Biceps	1, 10
Triceps	1, 10
Finger flexion	1, 10
Finger Extension	1, 10

Figure 1. Structures tested bilaterally and the treatment number tested.

Treatment Plan

The “one to ten” pain scale was used throughout treatments as a form of communication between the therapist and client. The scale used is based on Rattray’s (2005) pain scale where 1 is no pain, seven is to the patient’s tolerance, and ten is extreme pain. During the treatments the aim was to never reach pain over a seven. Each treatment short term goals were set (See Appendix C) to go along with long term goals of treating the pain-tension cycle, decreasing fear of movement and guarding as well as decreasing MPS and WAD symptoms. Treatments included deep moist heat, a hydrocollator was introduced in treatment 12. The concluding 3 treatments were performed completely in supine allowing for more time spent on anterior

cervical muscles and longer fascial holds. Deep breathing was encouraged throughout all treatments and diaphragmatic breathing was introduced in treatment 9. Diaphragmatic breathing increases proper body functions such as proper lymphatic drainage, gas exchange, increases relaxation while decreasing pain and stress (Rattray & Ludwig, 2005, p.35). Pillowing and heat were adjusted to the patient's comfort level and treatment position.

Back: Began in prone and treated 15 minutes. Hypertonicity and trigger points were palpated and released. Vertical stroking was used along the erector spinae group in long deep strokes from iliac crest to around scapula to inferior CS. Deep work over bony prominences was avoided (Barnes, 1990, p.108) Fingertip shearing surrounding scapula and direct cross-hand shearing to thoracolumbar fascia were applied according to presentation of the tissues each day (Barnes, 1990, p.103-104). Flushing hyperemic areas to decrease the chance of healing crisis and slow rib raking released tension held in the intercostal muscles to promote relaxation. Other muscles treated using GSM were: rhomboids, serratus anterior, trapezius, infraspinatus, teres major, teres minor and latissimus dorsi. Trigger point release to muscles with taut bands, nodules and referral patterns included subscapularis, trapezius, supraspinatus and levator scapulae (Travell & Simons, 1999). After working out the trigger points using the pain scale, the patient actively shrugged her shoulders to reset the neurological pathway (Travell & Simons, 1999).

Chest and Axilla: In supine for ten minutes pectoralis major, minor, subscapularis and subclavius were treated. Treatments began with cross-hand shearing to release adhesions of pectoralis major and minor, strumming across pectoralis major and slow arm pulls all were administered to release the fascia (Barnes, 1990, p.110-114). With the patient's arm above her head resting on the face holder, subscapularis, subclavius and pectoralis major trigger points were accessed. The pain scale and visual cues of apprehension on the patients face and feet were

important in this area. Flushing to avoid a healing crisis was applied and the client was asked to actively move her arm into internal rotation and adduction to reset neurological pathways to reinforce positive motion (Rattray & Ludwig, 2005).

Anterior neck: Treatment time in supine for 15 minutes. The infra and supra hyoid group, SCM, rectus capitus and longus colli were all treated here. The therapist asked for permission to treat this area each appointment, especially when treating longus colli and moving the trachea to the side. A hyoid release was done treating the infra hyoid group first and the supra hyoid group last (Barnes, 1990, p.174-175). While anchoring at the sternum to pick up slack, the client closed her mouth and extended her head stretching platysma. Techniques for SCM and longus colli included unilateral stripping, trigger points and attachment release. Communication and altering pressure is vital for anterior muscle work. Point pressure was applied to rectus capitus. The patient was asked to flex her head slightly and hold while trigger points were released. Because of the sensitive nature of anterior neck muscles, 3 minutes was set aside for flushing to avoid a healing crisis (Rattray & Ludwig, 2005).

Posterior neck, head and face: In supine for ten minutes. Some techniques used intermittently throughout the treatment were shoulder compressions, CS passive ROM, gentle traction, translations, ear pulls and gentle stretching of scalene (Barnes, 1990). Levator scapulae, trapezius, scalene, SCM, multifidi, rotatores, and cervical splenius group were all treated with GSM techniques (Rattray & Ludwig, 2005). Other modus operandi include: fascia release of suboccipital muscles, contract relax of multifidi, scalene, splenius capitus and splenius cervicis muscles (Rattray & Ludwig, 2005). In the head and face region, point pressure release of occipitalis, temporalis, frontalis, masseter, and lateral pterygoid were important not to overlook. Compression and decompressions of the face, while having the patient open and close her mouth

relaxed muscles in the TMJ area (Barnes, 1990). Fingertip shearing to release fascia around the body of mandible was applied as well as gentle GSM from medial to lateral across the mandible, zygomatic arch and frontal bone. The treatment ended with compression to the head and CS passive ROM and translations (Barnes, 1990).

Home Care: An attempt was made to take in a list of all previously prescribed homecare but an incomplete list was produced. Building a new homecare plan starting with only diaphragmatic breathing was attempted, but the client was not willing to cease her previously prescribed exercises and stretches (See Figure 2 for homecare information and Appendix D for complete description).

Structure	Objective	Introduction	Frequency	Intensity	Duration	Safety
Scalene	Stretch	Tx. 1 - 12	1 x Day	Feel stretch	5 deep breaths per side.	No pain.
Heat	Relax/Circulation	Tx. 1 - 12	1 x Day	Hot	20 Minutes.	No pain.
Journal	Emotion	Tx. 1 - 12	2 x Day	Short Entry	Describe Symptoms.	
Cervical Isometric	Strengthen	Tx. 2 - 12	2 x Day	To resistance	3 set – 1 rep.	No pain.
Suboccipital	Stretch	Tx. 2 - 12	1 x Day	Feel Stretch	5 deep breaths.	No pain.
Pectorals in Doorway or in Shower	Stretch	Tx. 5 - 12	2 x Day	Feel Stretch	5 deep breaths per arm.	No pain.
Trapezius Limb Loading	Strengthen	Tx. 7 - 12	2 x Day	To resistance	1 set, 6 reps each position.	No pain.
Diaphragmatic Breathing	Relax	Tx. 9 - 12	1 x Day	30 slow deep breaths	Deep relaxation, pulling awareness into body and diaphragm.	

Figure 2. The structure, objective, treatment and FIDS for homecare is described.

Results

The client showed body awareness and could discuss uncomfortable muscles and boney landmarks which allowed for open communication about pain, sometimes to a detriment. Some muscle and special tests were modified, skewing the results for a positive or negative test. Even though controlled stretching of short muscles and strengthening of lengthened muscles was explained, the homecare was sometimes not completed. The client's negative reaction to certain testing and at home exercise is an example of muscle guarding and avoidance behavior which have been previously discussed as strengthening the pain-tension cycle. Some examples of this kinesiophobia during assessments are quoted (See Appendix A).

Collecting qualitative data through questionnaires, interviews, assessment and journaling were used to gain better understanding of subjective information about MPS and WAD symptoms. Since this project was initially meant to decrease chronic tinnitus related to WAD, the THI was assigned. According to the patient, this survey actually brought her attention to the tinnitus, which she tried to ignore making it more noticeable and possibly worse (See Appendix A and B). An email was sent from the client after treatment 8 describing her feelings about the questionnaires, her wishes for the following treatments and her description of stress pertaining to her pain (See Appendix A). This email solidifies the importance of treating the pain tension cycle and chronic pain rather than specifics of tinnitus due to whiplash.

Re-testing post treatment determined that techniques being used were having a positive effect on short term treatment goals (See Appendix C). Also, during interview, the client confirmed that the rate and intensity of headache and dizziness had declined from daily to once per week, or less.

The NDI results show that most symptoms had stayed the same or reduced over the 12 treatment time period, only lifting and reading categories show an increase in symptoms (Figures 3 and 4). In the overall final score, the client’s symptoms did decline. The highest possible score for individual questions was 5. The highest total score is 50. The client’s highest total score was 26. According to Vernon (1991), an NDI a score of 26 coincides with severe disability, her score then lowers to 22 of moderate disability (See appendix B).

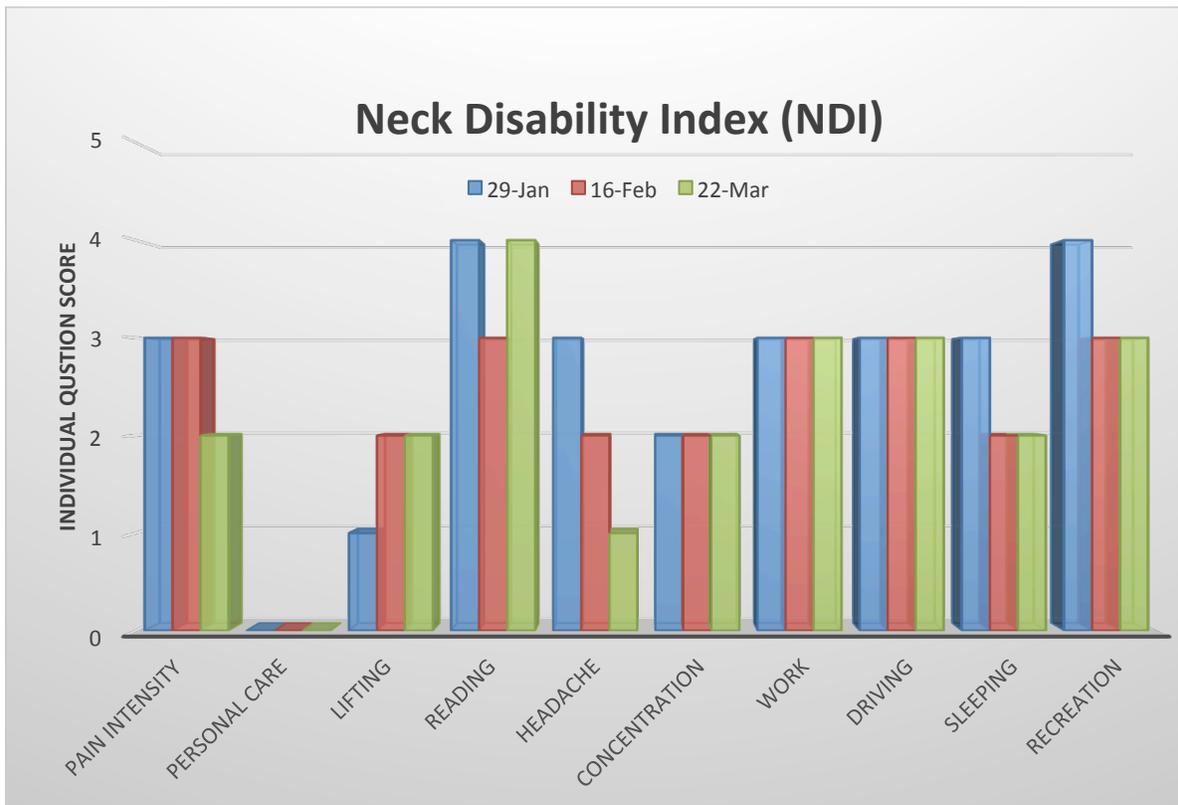


Figure 3. Individual scores for questions out of 5 on the NDI questionnaire. Treatment 1 in blue, Treatment 5 in red, Treatment 10 in green.

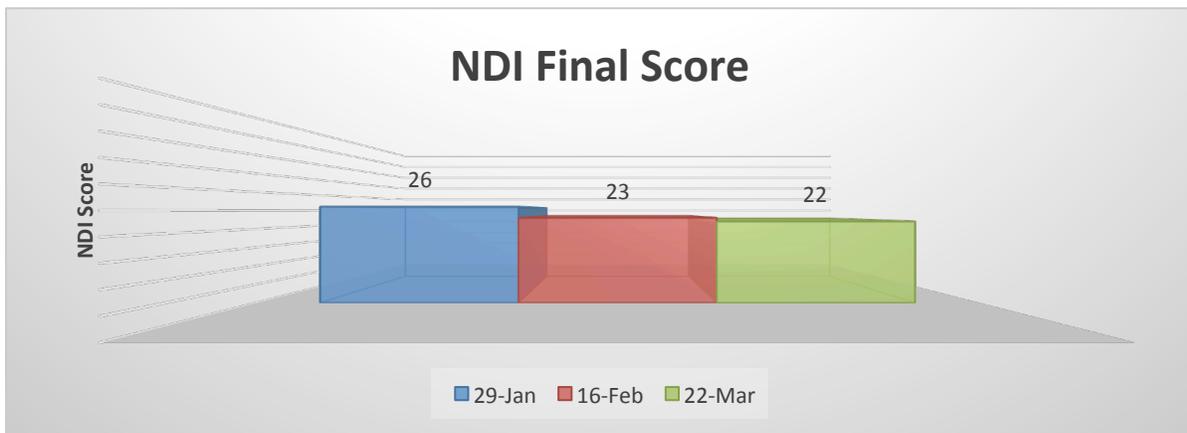
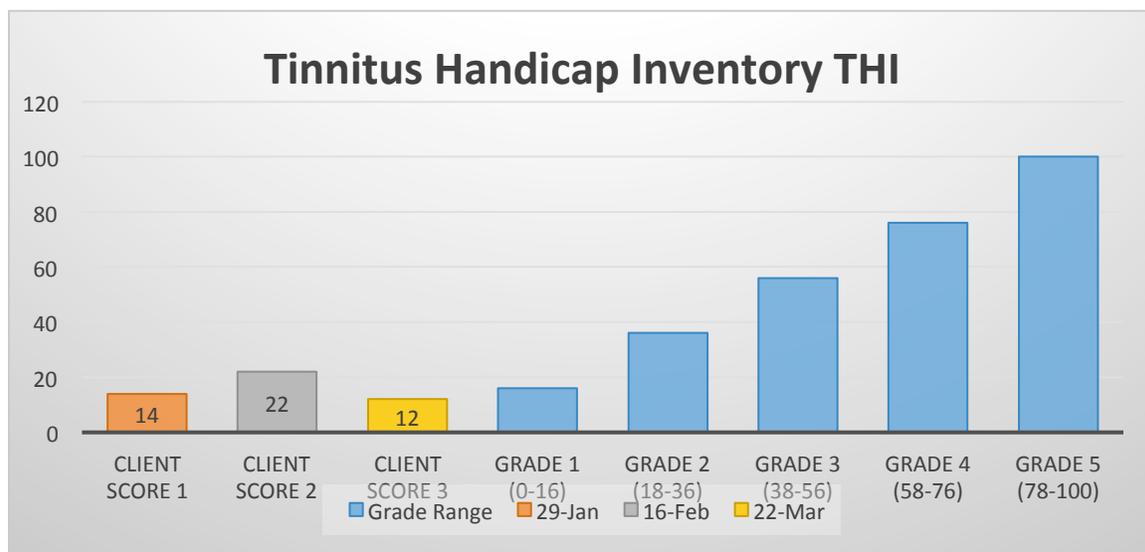


Figure 4. Final NDI score. Treatment 1 in blue, Treatment 5 in red, Treatment 10 in green. Score of 15 – 24 is moderate disability (Treatment 5 and 10). Score 25 – 34 is severe disability (Treatment 1). See Appendix B for full score information (Vernon & Moir, 1991).

The Tinnitus Handicap Inventory (THI) shows that the client's tinnitus did in fact increase when asked to focus on and describe her tinnitus. The base score on January 29th was 14, slight THI, two weeks later after being asked to focus on grading her tinnitus, on February 16th, the clients score was 22, mild THI. The third round on March 22nd showed a score of 12,



mild THI, after the focus of treatment had shifted, see figure 5 (McCombe, A., et al., 2001).

Figure 5. Final THI score. Treatment 1 (orange) – Grade 1. Treatment 2 (grey) – Grade 2. Treatment 3 (yellow) – Grade 1. See Appendix B for full score information (McCombe, A., et al., 2001).

Journaling was the final qualitative assessment used to track progress. Two sets of data have been charted (See Figure 6 and 7). The first chart shows actual data from the journal entries written. The second chart shows amended data. In figure 6 tinnitus entries have almost been completely left out and stress levels are high. The results in figure 6 and 7 are based on a weekly average for each symptom. While journaling the client focused mostly pain rather than factors that she tried to ignore such as headache, dizziness, and most markedly tinnitus. Some information from some columns are missing because the client did not record any symptoms for

that category. All numbers are based on the pain scale with 1 being no pain or discomfort at all, and 10 being the worst she had ever felt in her life. The client clearly describes by email the reasons for not doing her homecare, that she would like more intensity when being treated and explains the stress in her life. The client explains even though her journal entries display high stress levels, she does not feel stressed, rather she has many accumulating stressors in her life. She also reported that she had noticed over the years, her pain is directly related to her activity and work levels (See Appendix A). This email confirmed the primary focus of treatment should be treating avoidance and pain tension cycle (Vlaeyen, et al., 1995).

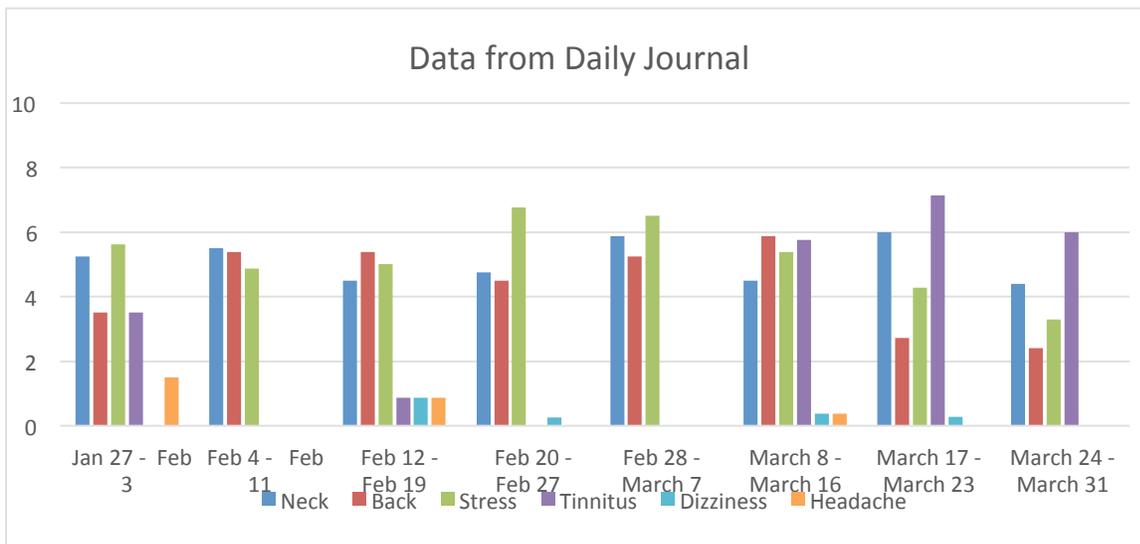


Figure 6. Results from take home journal. Average weekly scores from client information. (See appendix A and D)

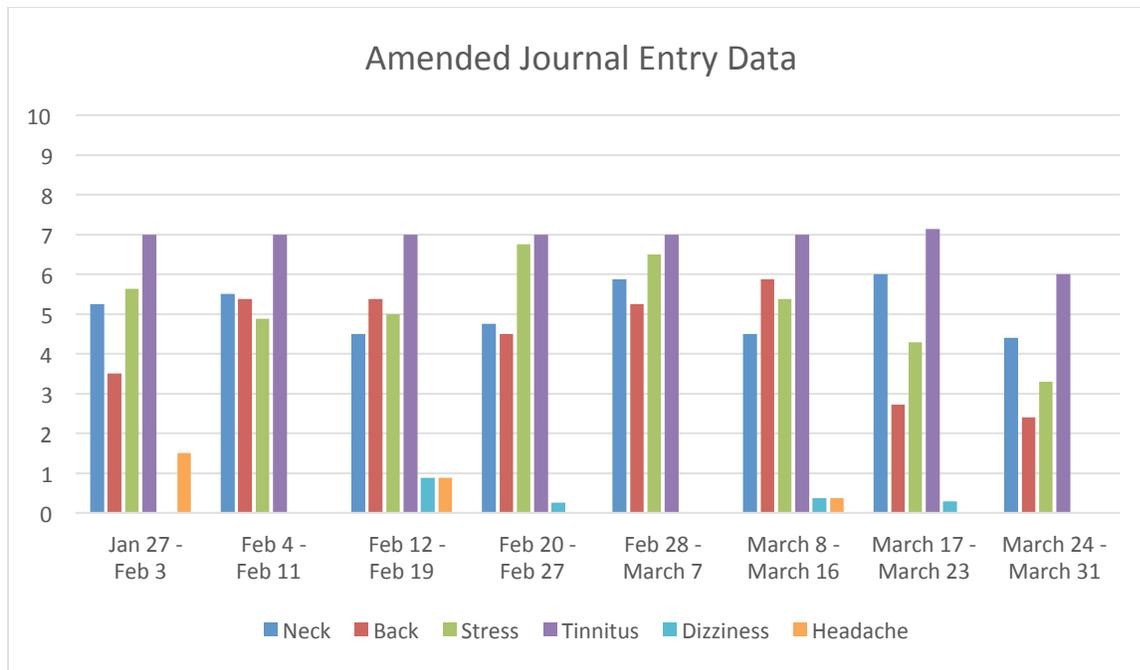


Figure 7. Amended average weekly scores from client information. (See Appendix A and D)

Discussion

In terms of treating the pain tension cycle, in a person with chronic pain and symptoms, this case presentation was a good start. Each treatment the client demonstrated improvements during assessment and reassessment post treatment. The client confirmed verbally and through email that she had seen signs of improvement in her MPS and WAD symptoms (See Appendix A). The NDI and THI both showed a decrease in symptoms. The most positive feedback from the client was with regards to treating muscles of anterior chest and neck. When treating back and neck issues, often time these anterior muscles are avoided because they are intrusive to the client. Flushing was an important part of the treatment plan because muscles were being released that had been held contracted for years. If flushing was not performed that client would feel flu like symptoms following the treatment (Rattray & Ludwig, 2005).

The study design could have been improved by performing manual muscle tests on pectoralis major and minor and using more varied orthopedic testing. The SCM manual muscle

test and the maximum compression test were both modified to suit the patient's interests. The client would not lift her head for the SCM test and instead of trying each treatment to see if the client would lift her head, a different test should have been performed (See appendix A and B).

Also, the maximum compression test was never done with compression. The journaling homework assignment was not clear enough for my client and expectations should have been written out clearly. The results show enough data, but clearer results could have been identified.

In future, it will be remembered to listen to what the client wants. If they do not want to do a specific test it is up to the professional to choose or modify treatment for the best results. Asking permission is also very important so the client knows that they are in control of the treatment at all times, especially when performing techniques around the front of the neck. Treating longus colli in gentle strokes and fingertip shearing the fascia is a technique that requires extensive warming up and flushing out, but was extremely beneficial to this client. If a client is living with pain, it is important to put their needs first to reduce guarding and avoidance. With great communication and varied techniques, in the anterior cervical area, can be beneficial to the client with chronic pain and WAD symptoms.

Conclusion

In conclusion, although there are many ways to test physical pain and structures of the body, the key to treating a patient with chronic pain is listening to them. The testing in this study showed improvement, but my client also had some great feedback. She openly discussed what she liked and what she did not like throughout the sessions. There were improvements made each session. Although my patient did not want to do some of the testing and did not feel the questionnaires were helpful to treating her, professionally the decision was made to do these tests. It is important to do what is professionally indicated, but also listen to the client. Janet

Travell (1999) said it best when she said, “Clinicians must believe that their patients hurt as much and in the way that they say they do.” It is possible to treat the pain tension cycle in a patient with symptoms of MPS and WAD symptoms through massage, although, it takes time, comfort and safety. Having open communication with the client, doing what they like, and doing what is professionally indicated without causing harm, can treat the symptoms, the client, and make a great massage therapist.

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Appendix A – Client email

Quotes from client sent March 21st (prior to treatment 9). Verbal permission was granted to use these quotes on March 22nd and written permission was granted by email on April 28th.

- 1) “It may seem that we haven’t made any progress given my current flare up but I wanted to let you know that I felt significant progress being made on my neck prior to my current flare up.”
- 2) “I noticed that you have pulled back on your treatment intensity over the past 3 sessions which I assume is because you felt that the treatments weren’t working. Those earlier treatments were working though and I would really benefit from some of the techniques that you were using earlier on in my treatment.”
- 3) “Looking at the symptom scale alone might lead one to think that I am not making progress, but the symptom scale does not capture the full picture, as it does not account for changes in activity level. My activity level directly correlates with my symptom level, and my activity level has increased dramatically since the end of January.”
- 4) “The symptom scale drives me nuts to be honest. Over the past 10 years it has made me very frustrated for a number of reasons:
 - a. It is very subjective
 - b. It tends to draw your attention to the symptoms on an emotional level and in that way can amplify the perception of pain. This is especially an issue with tinnitus. My coping strategy for tinnitus has been to ignore it since I know it is not a serious problem, but by putting a number on it every day I am drawing greater attention to it and therefore it seems like a greater problem.
 - c. In terms of the stress scale – I have been over-estimating these numbers as I have been rating my perceived ‘stressors’ rather than my actual level of stress. I would suggest lowering all of my stress scale numbers by 2 points (i.e., change a 7 to a 5)
- 5) “I feel the testing of the strength of my scalene (patient was referring to SCM manual muscle testing) is not appropriate at the moment – these muscles are in a very contracted (weak) state right now and the test involving holding my head up (10lbs) could strain those muscles. I do not want to do this test for at least a few weeks.”

Appendix B - Assessment

Cervical ROM: Cervical ROM was tested and recorded each treatment by the therapists soft eye. ROM limitations and pain were recorded for PROM and AROM. The therapist attempted to use a goniometer but found the readings were not accurate each session. Rattray & Ludwig (2005) state that the goniometer is not the most accurate tool for spine ROM readings.

Neck Disability Index (NDI): The NDI was completed by the client on treatment 1, 5 and 10. “This questionnaire should be used at the start of treatment as a baseline, and then every two weeks during the treatment program. There must be a five mark difference in the final score for the treatment to be clinically meaningful” (Vernon & Mior, 1991). The scoring is as follows: 0-4, no disability. 5-14, mild disability. 15 – 24, moderate disability. 25 – 34, severe disability. Above 34, complete disability. It is important for the therapist to not try to treat to get a zero because a client will usually put a number down for their pain, even if they have fully recovered (Vernon & Moir, 1991).

Tinnitus Handicap Inventory (THI): The THI was completed by the client on treatment 1, 5 and 10. There are 5 grades.

Grade 1 THI 0-16 (slight) - Tinnitus is heard in quiet environments and easily masked.

Grade 2 THI 18 – 36 (mild) - Tinnitus is easily forgotten about but may interfere with sleep.

Grade 3 THI 38 – 56 (moderate) – Not easily forgotten during activity. May interfere with sleep.

Grade 4 THI 58 – 76 (severe) - Always heard. Cannot be masked. Affects sleep and activities.

Grade 5 THI 78 – 100 (catastrophic) - Worst case. Associated with hearing loss and psychological issues (McCombe, A., et al., 2001).

****Grade 2 and 3 are most common for people living with tinnitus. ****

Orthopedic Testing:

Functional Opening Test (3 Knuckle Test): Determines whether the mouth can functionally open. Also, checks for hypomobility of the TMJ (Magee, 2008, p. 214).

Lateral Deviation of the Jaw: Indicates whether the lateral pterygoid, masseter, or temporalis muscle, the disc, or contralateral lateral ligament are affected (Magee, 2008, p. 215).

Cervical Myotomes: Tests the nerve roots of C1 – T1. They are tested by resisted isometric movements held for five seconds checking for weakness (Magee, 2008, p.155).

The Vertebral Artery Test: Checks for abnormal compression in the contralateral cervical artery (Magee, 2008, p.171).

Upper Limb Tension Test One (ULTT1): Puts stress on the neurological structures of the upper limb specifically the Median nerve, anterior interosseous nerve and C5,C6 and C7 nerve roots (Magee, 2008, p.164,165).

Maximum Cervical Compression Test: Patient extends, side flexes and rotates the head. Compression should be applied, but upon checking in with the patient it was against her wishes. This test indicates nerve root, facet pathology or muscle strain depending on where pain is felt (Magee, 2008, p. 163).

Manual Muscle Testing:

All manual muscle tests were done in three stages. First patient would move the muscle and relax, then against gravity and finally against a break test. The muscles listed in Figure 1 were tested for strength. SCM, however was modified.

Sternocleidomastoid – Modified – This manual muscle test was modified by the clinician lifting the patients head and holding it in position. When the client was ready, the clinician would remove their hands, allowing the patient to hold their head up against gravity. The patient could hold her head up. No pressure was ever applied by the therapist.

Appendix C – Treatment Goals

Main Treatment (tx) Goals over 12 Treatments:

CERVICAL SPINE ROM	Sternocleidomastoid (SCM)	Symptoms:	Involving Scalene, SCM, Pectoralis major, Pectoralis minor and Trapezius	TMJ
Increase CS ROM in degrees. <i>Tx: 1, 12</i>	Increase circulation and nutrition to SCM <i>Tx: 2, 3, 9</i>	Decrease Dizziness <i>Tx: 10</i>	Decrease Trapezius pain during manual muscle testing. <i>Tx: 2, 3, 11</i>	Increase ability to open mouth for 3 knuckles test. <i>Tx: 9, 10</i>
Decrease Pain in CS ROM. <i>Tx: 3, 4, 5, 6, 12</i>	Decrease pain SCM on ROM testing. <i>Tx: 10</i>	Decrease Headache <i>Tx: 1, 5</i>	Decrease Hypertonicity of CS muscles. <i>Tx: 2, 5, 6, 7, 8, 11</i>	Increase rom in jaw. <i>Tx: 1</i>
Decrease Maximum Compression Test pain. <i>Tx: 4</i>	Decrease Hypertonicity of SCM muscles. <i>Tx: 2, 5, 6, 7, 8, 11</i>	Introduce Diaphragmatic breathing. <i>Tx: 9</i>	Decrease CS pain during manual muscle testing. <i>Tx: 1, 12</i>	

Appendix D - Homecare

Scalene Stretch: “The patient is sitting in a chair and holding onto its underside. The patient positions the head in axial extension, side bends opposite, and rotates toward the same side as the muscle being stretched. To stretch, she pulls away from the side she is holding, inhales, exhales, and holds the stretch position” (Kisner & Colby, 2007, p.492).

Deep Moist Heat: “Heat prior to stretching is an important element of rehabilitation. As the temperature of muscle increases, the amount of force and time required to stretch decreases. A decrease in the rate of firing of the type II efferents from the muscle spindles and an increase in the sensitivity of the GTO, causes tissues to relax and more easily lengthen. Thermal agents are used primarily to heat small areas such as individual joints, muscle groups, or tendons and may be applied prior to or during the stretching procedure. Increasing circulation and core body temperature, also have been used as a mechanism to warm up large muscle groups prior to stretching” (Kisner & Colby, 2007, p.101-102).

Journaling: Patient Journals twice each day using the pain scale out of 10 to describe her muscular tension, headache, dizziness, tinnitus, and stress levels. Each appointment results are collected. In figure 6 and figure 7 results for each week are recorded as an average.

Cervical Isometric Exercises: “Patient position seated. Flexion - Have the patient place both hands on the forehead and press the forehead into the palms in a nodding fashion while not moving. Side bending - Have the patient press one hand against the side of the head and attempt to side bend, as if trying to bring the ear toward the shoulder but not allowing motion. Axial extension - Have the patient press the back of the head into both hands, which are placed in the back, near the top of the head. Rotation - Have the patient press one hand against the region just superior and lateral to the eye and attempt to turn the head to look over the shoulder without allowing motion” (Kisner & Colby, 2007, p.522).

Suboccipital Stretch: “Patient position sitting. Patient performs a chin tuck (axial extension), then nods the head, bringing the chin toward the larynx until a stretch is felt in the suboccipital area. The patient puts a light pressure under the occipital region with the palm of her hand while tipping the head forward to reinforce the motion. For a unilateral stretch, perform a chin tuck, rotate slightly (up to 45°) to the left or right, and then nod. The weight of the head is enough stretch force. The patient should not pull on the head” (Kisner & Colby, 2007, p.492).

Pectoralis Stretch in Doorway or Shower: “Patient position standing, facing a corner or open door, with the arms in a reverse T or a V against the wall. The patient leans the entire body forward from the ankles (knees slightly flexed). The degree of stretch can be adjusted by the amount of forward movement” (Kisner & Colby, 2007, p.593). The patient can do this stretch in the shower to add in heat during the stretch.

Limb Loading: “For basic stabilization progression of cervical musculature in prone position. Position 1) Arms at side, shoulder lateral rotation, and scapular adduction. Position 2) Arms at 90/90, horizontal abduction, and scapular adduction. Position 3) Shoulder elevation full range. Position 4) Shoulders 90° with lateral rotation and elbow extended, horizontal abduction, and scapular adduction” (Kisner & Colby, 2007, p.515).

Diaphragmatic Breathing: “Slow, deep breathing with relaxation of the upper thorax is the most efficient method for exchange of air to use with relaxation techniques. The patient relaxes the abdomen during inspiration so that it feels as though the abdominal cavity is “filling up” and the ribs are expanding laterally. During exhalation, the abdominal cavity becomes smaller; active contraction of the abdominal muscles is not necessary with relaxed breathing. To prevent hyperventilation, emphasize a slow rate of breathing. Caution the woman to decrease the intensity of the breathing if she experiences dizziness or feels tingling in the lips and fingers” (Kisner & Colby, 2007, p.950).