Evaluating the impact of Travell trigger point massage, joint oscillations, and Swedish massage on the shoulder girdle inclusive of C4-T1 nerve roots, post local anesthetic injection treatments.

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Abstract

Thoracic Outlet Syndrome is a condition where the nerves, arteries, or veins are compressed by structures that make up the thoracic outlet. (Gruneback, Arnold, Lum, 2005) There is no treatment protocol for working with patients receiving anesthetic injection treatments for pain management along with massage therapy. Objectives of this case study are to evaluate the impact of Travell trigger point massage, joint oscillations, and Swedish massage on the shoulder girdle inclusive of C4-T1 nerve roots, post local anesthetic injection treatments. The patient, a 52-year old female, diagnosed with thoracic outlet syndrome bilaterally with increased symptoms on left side. She received 8 treatments over 5 weeks, 2 treatments a week with a one-week break. Treatments included techniques such as Travell trigger point release, joint oscillations, and Swedish massage. Pre-treatment and post-treatment assessments of Myotome and Dermatome testing of the upper torso, and selected resisted muscle tests of the neck and arm, were used to evaluate resulting impact. In the three metrics measuring pain, there was a significant decrease observed by the patient over the five weeks of treatment. Muscle functioning improved over the duration of the study. Travell trigger point massage, joint oscillations, and Swedish massage on the shoulder girdle inclusive of C4-T1 nerve roots, post local anesthetic injection treatments, has proven to decrease patient pain and increase patient's ability to participate in activities of daily living. Although the findings were positive for the researchers hypothesis, further research will be needed to prove the significance and effectiveness of the combination of therapeutic massage and anesthetic injection therapy.

Keywords: Travell Trigger Points, Thoracic Outlet Syndrome, Anesthetic Injections, Shoulder and Neck Pain

Conflicts of Interest

There is an ongoing familial relationship with the patient and the therapist. Consent for treatment and an explanation of the research protocol was reviewed with the patient prior to the case study taking place. Clear boundaries were established and adhered to throughout the research study period, including information shared by the patient. All information shared during the research study was kept relevant to the research project.

Evaluating the impact of Travell trigger point massage, joint oscillations, and Swedish massage on the shoulder girdle inclusive of C4-T1 nerve roots, post local anesthetic injection treatments.

Thoracic Outlet Syndrome (TOS) is a condition where the nerves, arteries, or veins are compressed by structures that make up the thoracic outlet. (Gruneback et al., 2005) Structures that make up the thoracic outlet include anterior, middle and posterior scalenes, upper fibers of trapezius, pectoralis major, the first rib, scapulae, clavicle, coracoid process, deltopectoral fascia, and the axilla. (Kinser, Colby, 2012) There are three main types of TOS described in the literature; neurogenic, arterial and venous. (Gruneback et al., 2005) The focus of this case study will be on Neurogenic TOS, more specifically, non specific symptomatic neurogenic TOS. (Kinser, Colby, 2012) Symptoms as indicated by the patient could include paresthesia or numbness down the arm and pain with carrying heavy objects or raising the arm above the head. (Rattray, Ludwig, 2000) Patients might also find progressive weakness in the affected side(s) and a decreased ability to perform delicate, small movements. (Rattray, Ludwig, 2000) Contributing factors to this condition include poor posture, trauma, continual stress to the shoulder girdle, and injuries such as a previously broken clavicle. (Kinser, Colby, 2012)

Upon palpation of the structures that make up the thoracic outlet, the therapist could find Trigger Points in the skeletal muscle that might be contributing to the compression of the nerves, arteries and veins. Trigger Points (TrPs) are a palpable, taught band of skeletal muscle fiber(s) that cause both local and referred pain. (Rattray, Ludwig, 2000) Active TrPs are painful at rest and with movement, whereas latent TrPs are painful only when manual pressure is applied. (Fryer, Hodgson, 2005) TrPs can be found in skeletal muscle tissue, ligaments, joint capsules,

periosteum and fascia. (Rattray, Ludwig, 2000) Treating TrPs includes using techniques such as Travell trigger point release, NMT trigger point release, ischemic compression, dry needling, therapeutic ultrasound, laser irritation and injection. (Simmons, 2002) For this case study, the focus will be on using Travell trigger point release for treatment of TrPs. The patient has also received local anesthetic injections for treatment of TrPs, previous to this study.

The literature on myofascial trigger point treatment seems to neither agree nor disagree on the effects of treatment. (Fryer, Hodgson, 2005) (Fernandez, Campo, Carnero, Page, 2005) Treatment of TrPs can be ineffective because of inadequate training or knowledge of practitioners. (Fryer, Hodgson, 2005) Furthermore, there are no definitive clinical tests to detect TrPs other than physical examination and palpation. (Fernandez et al., 2005) Therefore, manual therapists have to be well trained in detecting these palpable, taught bands of skeletal muscle fibers. There is discussion that more research should be done to confirm or deny the effects of TrPs release. (Fryer, Hodgson, 2005)

Image guided injection techniques are currently being used to help patients who are experiencing discomfort from cervical radiculopathy, facet joint irritation, sacroiliac joint pain and spondylolysis. (Silbergleit, Mehta, Sanders, Talati, 2001) Ultrasound guided local anesthetic injections are also being applied to help patients whom are experiencing chronic pain from TOS. Limited research has been done in the area of injection therapy being used to treat patients with TOS. There are still fewer resources available that evaluate the impact of massage in conjunction with these treatments.

This case study is important due to current protocols of how to treat patients post injection therapy of any kind. The current recommendation is to wait at least ten days to three weeks depending on the type of injection, so as to not disturb or alter the effects of the injection.

(Rattray, Ludwig, 2000) Due to these protocol parameters, clearance and encouragement was received from the patient's pain specialist to perform massage to areas treated with anesthetic injection. There are on-going recent studies that are pushing the boundaries of what the author established as protocol that should be looked into to see if our current methodology for treatment is appropriate. (Lugo, Garcia, Rodgers, Plata, 2016) (Coobes, Bisset, Brooks, Khan, Vincenzino, 2013) (Udea, Katatoka, Sagara, 1993) The specialist and therapist coordinated and communicated on treatments so all outcomes were for the benefit of the patient.

The purpose of this case study is to evaluate the impact of Travell trigger point massage, joint oscillations and Swedish massage on the shoulder girdle inclusive of C4-T1 nerve roots post local anesthetic injection treatments.

Methods

Client Profile

The patient is a 52-year-old female who is predominately left-handed. Occupation is a clerical office worker working four days a week, eight hours a day with tasks mostly consisting of data entry on the computer, answering phone calls, occasionally filling and preparing orders from the warehouse for small shipments and photocopying. Hobbies include gardening five hours a week, curling for two hours once a week, water color painting one hour every two weeks, kayaking two hours per week, photography one hour per week and crafting two hours per week. Currently, the patient experiences her TOS symptoms bilaterally, but generally states it is worse on her left side and aggravated by activity or for an unknown reason.

A neurologist diagnosed her TOS when she was 24 years old. Symptoms were increased significantly after a motor vehicle incident in 2002 when she T-boned another vehicle causing her body to go forward, and her seatbelt to compress her left clavicle and pectoralis region. She

describes the sensation she feels on her left side as stabby, gripping, painful and at times tingling and crushing. The patient will experience these symptoms if she does too many activities of daily living (ADL's) that are aggravating for her. Specifically, doing any activity above 90 degree's of abduction or flexion of the glenohumeral joint, lifting heavy items or repetitive movements starting at the wrist tend to exacerbate her TOS-associated symptoms. The patient finds she gets the most relief from her symptoms when she receives massage, participates in light exercise in cool pool water, performs slow methodical stretching, performs cold hydrotherapy treatments, goes for a float in a floatation tank, takes Advil, or uses a topical liniment such as Fisiocream, Voltaren or Pain be Gone. Additionally, she is finding her injection treatments to be very helpful. The patient has been seeing a pain specialist for her thoracic outlet syndrome since 2006, and she currently sees him once every three months for local anesthetic injections to nerve roots C4-T1 and trigger point injections. She also sees a chiropractor once a week whom bases treatments on client presentation week to week. The patient is currently waiting for a knee replacement for her right knee. She also has previously fractured her left clavicle and has a bilateral benign essential tremor.

Pre-Treatment assessments were completed bi-laterally of myotomes from C1-T1, dermatomes C2-T12 (Magee, 2008) and resisted muscle testing (RMMT) of anterior lateral neck flexors, posterior lateral neck extensors, biceps brachii, brachioradialis, levator scapulae, middle trapezius, lower trapezius, and upper trapezius. (Kendal, McCreary, Provance, Rodgers, Romani, 2005) Myotome testing concluded that T1 was positive on the right, C3, C5, C6, C8 were positive on the left. C2 was positive bilaterally for dermatome testing. (Magee, 2008) Dermatome testing was performed bi-laterally using ice to check for response of cutaneous innervation using the dermatome map. For RMMT, muscles were considered weak starting at a

grade of three because client could only hold resistance in test position without any added pressure. (Kendal et al. 2005) Therefore, bilaterally, middle and lower trapezius fibers were both weak. Anterior lateral neck flexors and levator scapula were weak on the left side. Treatments were modified for lighter pressure of massage if patient was taking NSAIDS because of decreased ability to respond to pain threshold. (Rattray, Ludwig, 2000) The patient goals from treatment are to have longer amounts of time in-between injections with her pain specialist; going from every three months to every four or five months. She would also like to have less pain during ADL's such as brushing her hair, any activities with her arms overhead, or when carrying something heavy (approximately 10lbs) or more.

Treatment Plan

Treatments started on Saturday, October 8th, 2016 and ended on Thursday, November 10th, 2016. Treatments routinely occurred on Sundays and Thursdays. The frequency and duration of treatments for this case study were two treatments per week for three weeks, each sixty minutes in length. The time was divided into twenty minutes for an interview and forty minutes for treatment. After a one week break, the researcher performed two treatments the week following. Treatments during this week were conducted for the same length of time as listed above. The study started three weeks after the patient being injected with local anesthetic to cervical nerve roots of C4-T1 and to TrPs, as described in Rattray. (Rattray, Ludwig, 2000) This case study followed the present protocol for treating a patient who has received injections. (Rattray, Ludwig, 2000)

Every treatment began with the patient lying prone, with shoulder, abdominal and shin pillowing for support. Deep diaphragmatic breathing (Rattray, Ludwig, 2000) was explained and

encouraged throughout each treatment. Rocking was performed to the torso, and compressions performed to the entire back and shoulders for one minute before undraping the back.

Longitudinal strokes were applied to the entire back to spread lotion followed with deep stroking applied down towards the left hip and then up towards the left shoulder. TrPs were treated Travell style (Rattray, Ludwig, 2000) as the therapist palpated them or as patient indicated specific point tenderness with or without referral. Muscles treated for TrPs while in prone position include levator scapulae and upper, middle and lower fiber trapezius. Knuckle kneads were applied over shoulder up to neck followed by picking-up of tissues in the left neck. Prone release of levator scapulae with rotation of the shoulder was performed with ten seconds of shaking to the left shoulder. Wringing of the left shoulder down towards left hip with additional deep stroking down the left side of the back and longitudinal strokes to the entire back. Open-c was performed on the left side of the back finishing with 30 seconds of gentle joint oscillations starting at T12 going to C6/7.

The patient was turned over to supine position, and the usage of pillows adjusted to one under her knees and two used in t-shape under spine, neck and head, and compressions are applied to bilateral shoulders for thirty seconds. The therapist encouraged the patient to use deep diaphragmatic breathing while performing longitudinal strokes to the shoulders and neck to spread lotion. Knuckle kneading and fingertip kneading were then applied to the left neck and left shoulder. TrPs were treated Travell style as palpated by the therapist or as patient indicates specific point tenderness, either with or without referral. Muscles treated for TrPs while in the supine position include anterior and middle scalenes, sternocleidomastoid, and splenius capitis. Fingertip kneading and deep stroking was performed to the posterior neck focusing on splenius

capitis. Fingertip kneading of the posterior neck and longitudinal strokes applied to the shoulders and neck completes the neck portion of the treatment.

The treatment concluded with longitudinal strokes being applied to the left arm focusing on biceps brachii and brachioradialis. First, working proximally on biceps brachii with knuckle kneading. TrPs were treated Travell style as palpated by the therapist or as patient indicates specific point tenderness, either with or without referral. Picking up of tissues of the anterior arm followed by palmer kneading was applied down the arm. Picking up of the tissues of brachioradialis was followed by longitudinal strokes to the lateral forearm. Deep stroking to brachioradialis was followed by picking up of the lateral forearm tissues concluding the treatment.

There are few indications for what a treatment plan would look like in the scientific literature regarding massage. Therefore, the treatment plan was built on established textbooks such as Clinical Massage Theory (Rattray, Ludwig, 2000), protocol from accredited curriculum and discussions with the patient's pain specialist. The researcher chose to treat TrPs in muscles that the pain specialist recently treated with anesthetic injections on the left side. This was chosen to evaluate if it had a further impact on patient pain levels and daily activity. Additionally, the researcher worked on muscles that were near the site of local anesthetic injections to the nerve roots of the neck from C4-T1 on the left side. Swedish massage techniques, such as longitudinal stroking, open-c and kneading were chosen to help flush the areas when working with TrPs that can elicit significant point tenderness.

Homecare suggestions given to the patient during treatment were as follows: A cold ice pack with towel for fifteen minutes or until "numb" in cold, burney, achy, numb (CBAN) applied on areas that were particularly tender from TrPs treatment once a day until treatments are

completed. (Rattray, Ludwig, 2000) A cold application was chosen over typical heat application post TrPs release due to patient aversion to heat at the time and cool hydrotherapy analgesic properties. (Sinclair, 2008) An ear to shoulder stretch done bilaterally with three variations: first ear to shoulder, then tilted nose to armpit, finishing with tilted nose to sky. Each position is held for thirty seconds and done twice on each side, started and once a day and was increased after treatment five, to two times daily, until treatments were completed. (Vizniak, 2015) This stretch was given to help decrease tension in the muscles of sternocleidomastoid and anterior, middle and posterior scalenes as treatment progresses. Prone neck extensions were given as a strengthening exercise targeting trapezius and levator scapulae. The patient was instructed to hold for five seconds, repeat six times for two sets, started as once a day and then was increased after the fifth treatment to twice daily, everyday until treatments were completed. (Vizniak, 2015) Suggestions to the patient for activities of daily living included patient awareness of posture while completing tasks at work, sitting in a neutral spine position, bilateral shoulder back and down, sitting tall, head straight. The patient was also educated on importance of getting up and physically moving around the office every thirty minutes, walking away from her desk for a minute duration. Education of ADL's was given to give the patient further control over their pain.

Assessments used during the treatment period include interviews every appointment, Defense and Veterans Pain Rating Scale (DVPRS) (Defense and Veterans Center for Integrative Pain Management, 1994), Shoulder Pain and Disability Index Scale (Transport Accident Commission), body charts, and patient diary discussing ADL's and location of pain updated on a weekly basis. Interviews were conducted on a bi-weekly basis as per treatments, and lasted twenty minutes. DVPRS, Shoulder Pain and Disability Index Scale, body charts and patient diary

results were kept on a bi-weekly basis as well. DVPRS was filled out twenty-four hours post treatment. (Defense and Veterans Center for Integrative Pain Management, 1994) The Shoulder Pain and Disability Index Scale and Body Charts were completed the day before each treatment. (Transport Accident Commission) The patient completed a diary as she observed changes in pain or as she participated in activities, making special note of changes in ability and performance.

Results

As reflected in the graph Figure 1, anterior lateral neck flexion resisted muscle strength test on the left was increased by one. Posterior lateral neck extension, Biceps Brachii, and Brachioradialis resisted muscle strength tests on the left were increased by one. Levator Scapulae and Upper Fibers Trapezius resisted muscle strength tests on the left were increased by two. There was no change found to the Middle Fibers Trapezius after the completion of treatments. A significant change was noted for Lower Fibers Trapezius muscle bilaterally with resisted muscle strength test from the patient being unable to hold against gravity, to being able to hold against gravity.

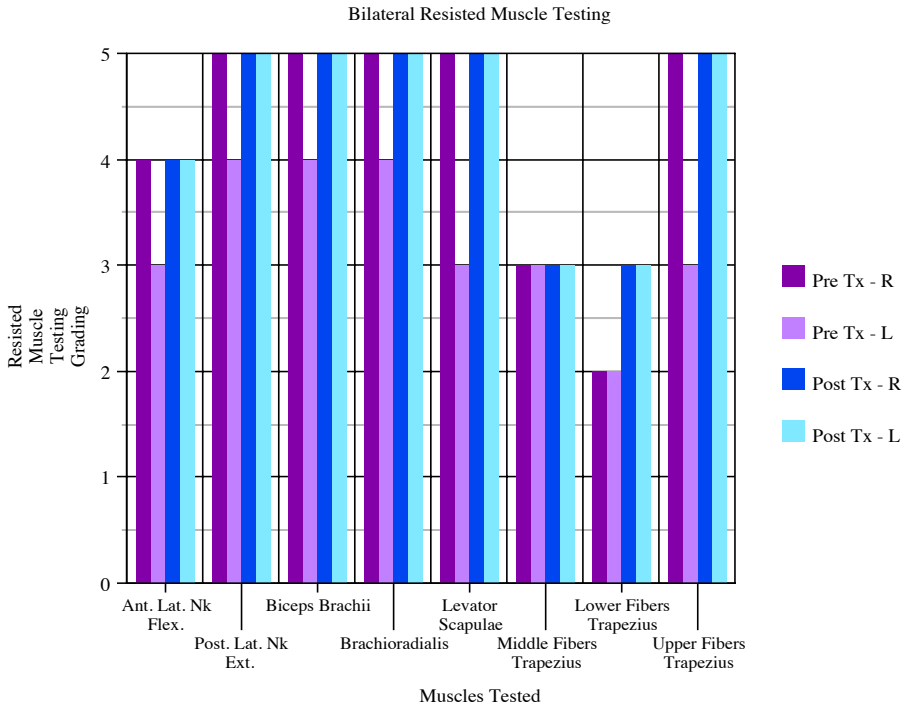

Figure 1: Graph showing pre-treatment and post-treatment testing outcomes for Bilateral Resisted Muscle Testing.

Myotome testing was placed in a table as seen in Table 1. Myotome testing bilaterally showed significantly improved results for myotome nerve roots C3, C5, C6, and C8 on the left, were all positive. Additionally, T1 on the right was positive. Post treatment assessment concluded that there were no positive results.

Myotome Testing - C1 to T1

Vertebral Level	Pre - R	Pre - L	Post - R	Post - L
C1-C2	~	~	~	~
C3	~	+	~	~
C4	~	~	~	~
C5	~	+	~	~
C6	~	+	~	~
C7	~	~	~	~
C8	~	+	~	~
T1	+	~	~	~

Negative Test Result = ~

Positive Test Result = +

Pre and Post Massge Treatment Testing

Table 1: A table showing results for pre-treatment and post-treatment bilateral myotome testing.

Figure 2 is a graph showing trends in pain in relation to sleep, activity, mood, and stress

over the five weeks of treatment. Pain that contributed to stress started at a seven pre-treatment, and decreased to a zero by treatment four and remained at a zero one month after the completion of treatment seven. Pain that interferes with sleep or mood started pre treatment at a six out of ten and decreased to zero out of ten by treatment five and remained at zero one month after the completion of treatment seven. Pain interfering with activity pre-treatment was initially at five out of ten and decreased to zero out of ten by treatment six and remained at a zero one month after the completion of treatment seven.

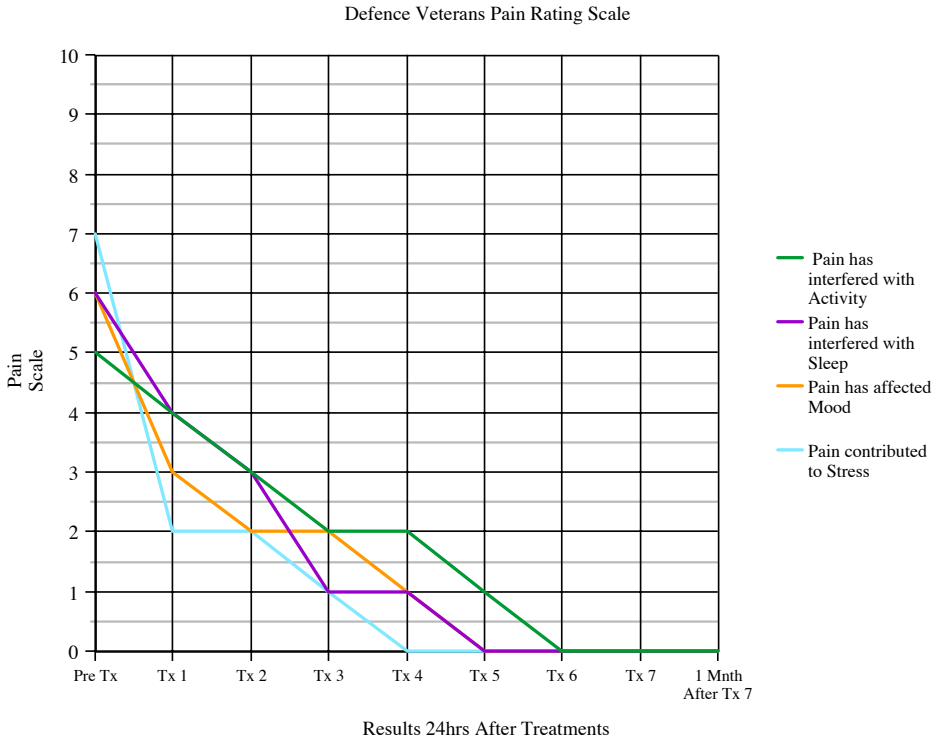

Figure 2: DVPRS Graph showing trends in pain in relation to activity, sleep, mood and stress over five weeks of treatments.

The graph in Figure 3 shows trends in pain in relation to specific activities over five weeks of treatments. Pre-treatment activities for the patient such as washing hair or carrying a heavy object range in difficulty from five to eight out of ten. Difficulties with these tasks became notably easier for the patient after treatment three progressing to no difficulty after treatment seven through a one month follow up period after the completion of this study.

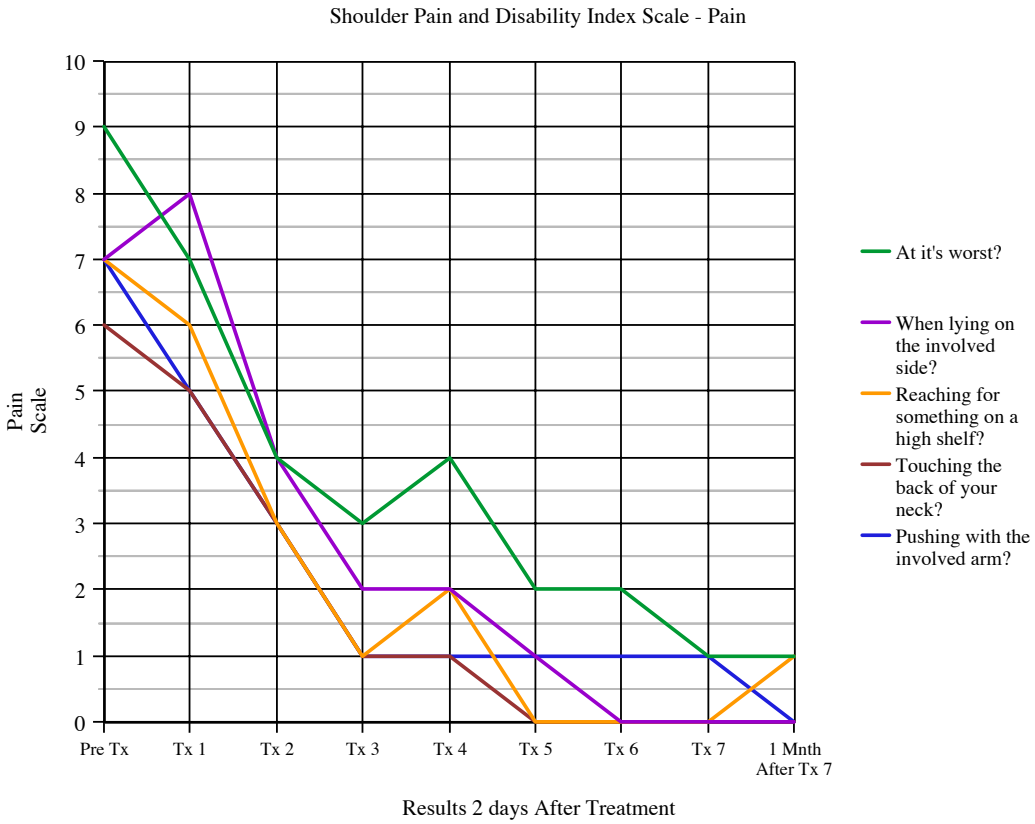

Figure 3: SPADIS graph showing trends in pain in relation to specific activities over five weeks of treatments.

Figure 4 is a graph showing difficulty in relation to specific activities of daily living over five weeks of treatments. Fluctuations in pain were seen after treatments one, four, and one month after treatment seven, with a general decline to minimal discomfort post completion of treatments. After treatment one, the patient had an increase in pain with lying on the involved side. After treatment four, there was an increase of pain at its worst from three out of ten, to four out of ten. Additionally, an increase in pain when reaching for something on a high shelf from one out of ten, to two out of ten. One month after treatment seven, an increase in pain for the patient was seen when reaching for something on a high shelf, from zero out of ten to one out of ten.

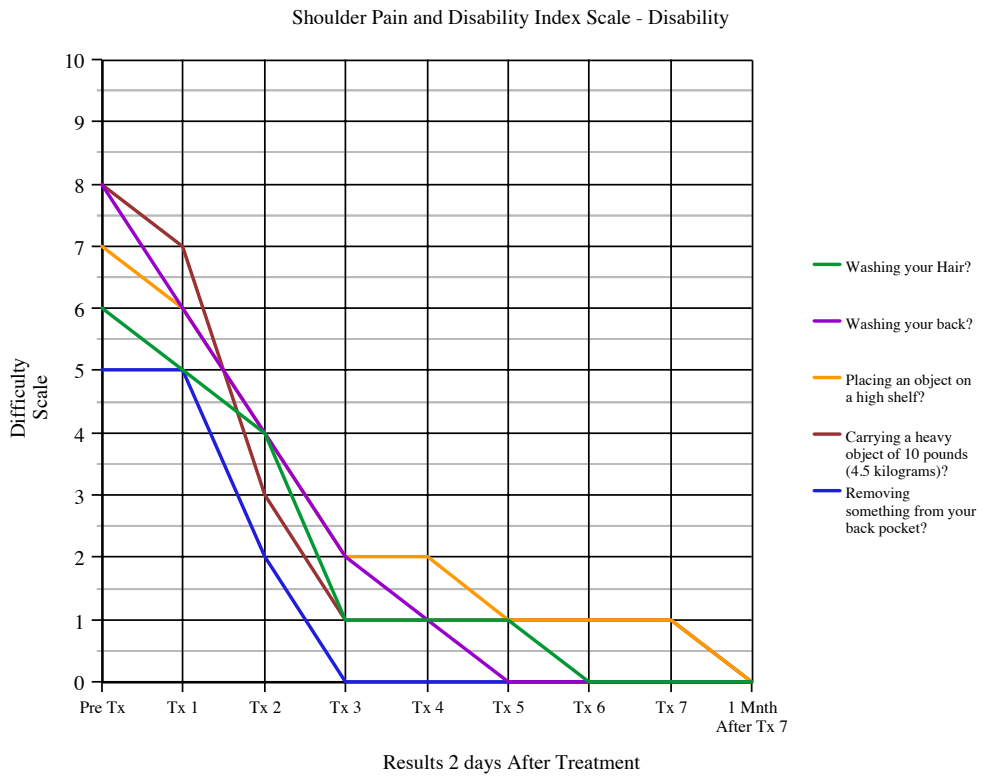

Figure 4: SPADIS graph showing trends in difficulty in relation to specific activities of daily living over five weeks of treatments.

Discussion

The purpose of this case study was to evaluate the impact of Travell trigger point massage, joint oscillations, and Swedish massage on the shoulder girdle inclusive of C4-T1 nerve roots, post local anesthetic injection treatments. This study identified that a massage protocol that includes Travell trigger point massage, joint oscillations, and Swedish massage after local anesthetic injections, is an effective form of treatment to reduce a patient's pain from TOS symptoms. As trends on the graphs demonstrate, a diminishing in patient's pain occurred and increased the patient's ability to do activities of daily living with no discomfort. The author noted fluctuations of pain seen in Figure 4 could be due to client increase of activities between appointments. The changes seen at treatment one could be correlated to the client being off work on vacation. The patient was finding herself to be busier and more active than her normal weekly

routine, as noted in her weekly journals. Fluctuations seen after treatment four could be correlated to an increase in activities of yard work, gardening, and crafting. Changes in pain one month after treatment seven, might have been seen due to the patient using a walker and cane for support after a full knee replacement on the right side. One month after treatment seven, the patient saw her pain specialist and reached her goal of not having to be injected. The patient was also cleared to not see her pain specialist for another four months.

Future studies on this topic should consider correlations between other common TrPs locations in muscles of the shoulder girdle and neck. The author noticed there were direct correlations to TrPs referral patterns when collecting information from the patient. The exact pattern of the pain the patient was describing was similar to TrPs referral patterns seen in Trail Guide. (Biel, 2014) While these areas weren't treated, as the injections were not in this location, further studies may yield positive results regarding TrPs pain referral and injection sites. The researcher recognizes it would have been beneficial to work bilaterally instead of just focusing treatment on the patients affected side.

This case study was intended to provide some guidelines of what a massage treatment protocol could be, for patients who are undergoing anesthetic injection treatments for TOS symptom management. Although the findings were positive for the researchers hypothesis, further research will be needed to prove the significance and effectiveness of the combination of therapeutic massage and anesthetic injection therapy. It's important that future researchers work in coordination with medical doctors and pain specialists, as there is not a wide database for a massage therapy treatment protocol in this increasingly common and problematic area of chronic pain treatment.

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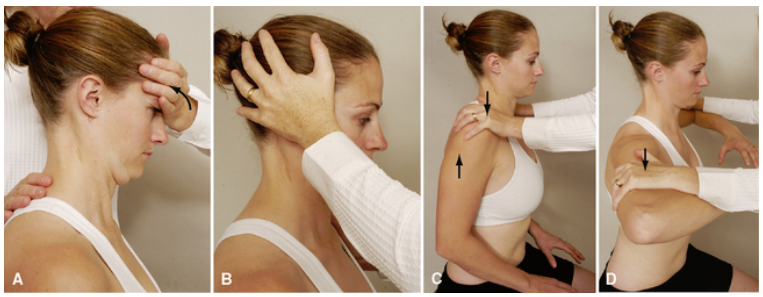
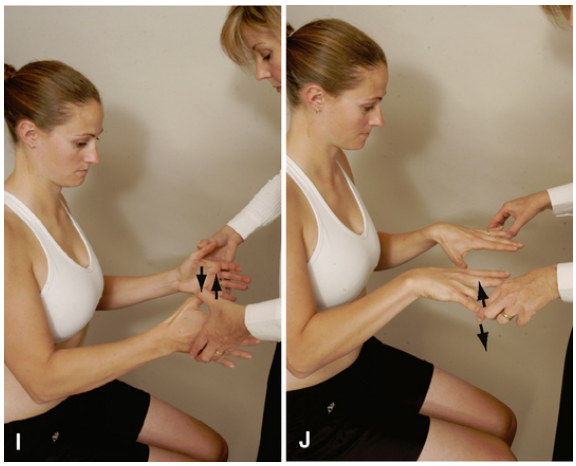
Appendix

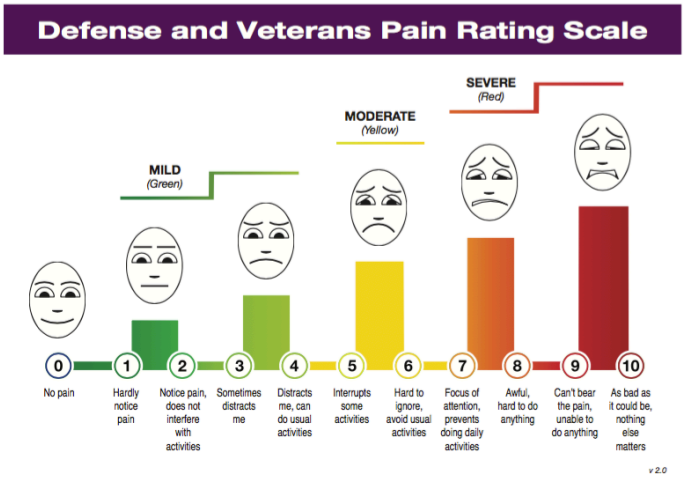


Appendix 1: Myotome testing of C1-5 as shown in Orthopedic Physical Assessment. (Magee, 2008)

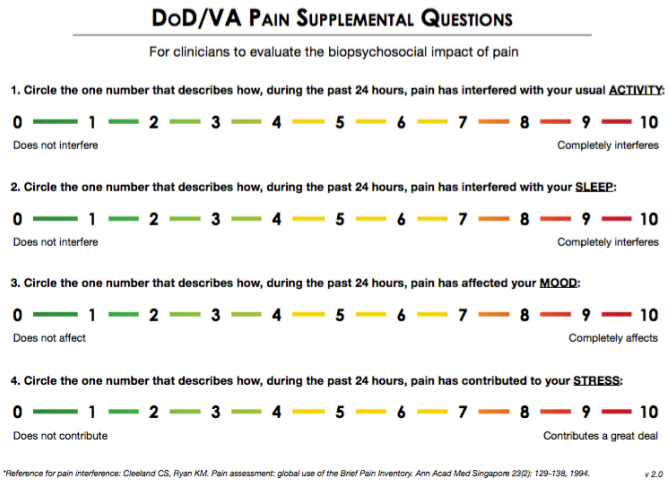
Appendix 2: Myotome testing of C6-7 as shown in Orthopedic Physical Assessment. (Magee, 2008)



Appendix 3: Myotome Testing of C8 –T1 as shown in Orthopedic Physical Assessment. (Magee, 2008)



Appendix 3: The Defense Veterans Pain Rating Scale. (Defense and Veterans Center for Integrative Pain Management, 1994)



Appendix 4: The Defense Veterans Pain Rating Scale. (Defense and Veterans Center for Integrative Pain Management, 1994)