



Clinical Case Report Competition

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Second Place Winner

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Efficacy of myofascial and trigger point release in the
treatment of chronic whiplash associated disorder

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ABSTRACT

Whiplash is a common injury affecting millions of people accounting for over 2 million insurance claims per year in Canada (1) and can result in long term pain and dysfunction of the neck. When symptoms of whiplash last beyond 6 months, it is classified as chronic whiplash-associated disorder (WAD) that commonly exhibits symptoms such as aching or stabbing neck pain, headaches and reduced range of motion. (2) In systemic reviews of conservative approaches to treating this condition, it has been concluded that there is conflicting and low-quality research addressing the efficacy of manual therapies, particularly massage therapy, as a stand-alone treatment in addressing chronic WAD. (7-9)

This study hypothesizes that massage therapy and in particular myofascial release and trigger point therapy are effective modalities for reducing the symptoms of pain and increasing range of motion of the neck in chronic WAD. The model of this study is a single-subject case study involving ten treatments over a six-week period. The subject is a 36 year-old female who sustained whiplash-associated injuries during a motor vehicle accident 7 years ago and has symptoms of neck pain, dull achiness, mild headaches and reduced range of motion. Myofascial release and trigger point therapy were applied to affected neck muscles every treatment with assessments done at the 1st, 4th, 7th and 10th sessions. Results showed a progressive increase in AROM of the cervical spine as well as a marked decrease in Neck Disability Index, (a score decrease from 7/50 – 0/50) and McGill Pain Questionnaire (decrease of 65% in the overall pain score.) In conclusion, the hypothesis was supported for massage therapy being an effective modality in treating

chronic whiplash associated disorder. Further recommendations would be to do an examiner-blinded larger population sample and shorter range timeline of chronic injury.

Key words: chronic neck injury, chronic whiplash associated disorder, massage therapy, myofascial release, trigger point release

INTRODUCTION

Chronic neck pain due to whiplash associated disorder is a prevalent complaint of populations in North America. It is a major concern as there are an estimated 2 million insurance claims per year in Canada for whiplash associated injuries due to motor vehicle accidents. (1) Over 60% of people in a motor vehicle accident who experience neck injury still have symptoms 6 months after the incident. (2) In British Columbia alone, the economic costs exceed \$600 million a year. (1)

Late-whiplash syndrome or chronic whiplash associated disorder (WAD) is the result of 'whiplash' or acceleration-deceleration injury to the cervical spine. It occurs when an individual traveling at high speeds in a vehicle is suddenly slowed or brought to a halt. (4) As Rattray outlines, (4) the body decelerates while the head continues moving forward, and then rapidly moves backward. This action causes strain to the muscles, ligaments and joint capsules of the neck and can result in soft tissue tearing and bone fracture. (4) The Quebec Task Force outlines 4 stages of injury due to WAD ranging from no symptoms to pain with or without clinically measurable damage to vertebral fracture and ligament severance. (4, p.383) The symptoms of whiplash may take a few hours to days to manifest and they typically present as neck stiffness, headaches and reduced range of motion. (5) The symptoms are considered to be chronic if they continue beyond 6 months. (5)

Chronic WAD has traditionally been treated both invasively with surgery and conservatively with medications, exercise and manual therapy. (4-6) Non-invasive

therapies include electric and laser applications, sterile water injections, joint mobilization, soft tissue manipulation, acupuncture and physical therapies including stretching and strengthening exercises. (6) While studies have been conducted addressing this entire range of treatment options, for the purposes of this paper the focus will be on massage therapy. There is much evidence to suggest that manual manipulation is an effective approach to treating chronic WAD symptoms when individual research papers are reviewed. (7-9) However, two separate systematic literature reviews have concluded that evidence supporting the efficacy of manipulation techniques was inconclusive. (7, 9) Jeannette Ezzo states that “no recommendations for practice can be made at this time because the effectiveness of massage for neck pain remains uncertain” (9, Abstract) and the Cochrane Review supports this view concluding that there are no clearly effective conservative treatments for chronic whiplash. (7) Both systemic reviews have noted that the issue may not be one of ineffectual *therapeutic techniques* but that the research models used need to have greater reliability and more rigorous standards of evaluation. (7, 9)

There are few research studies focusing specifically on soft tissue treatment of neck pain. Those that were found have not specifically investigated the effects of myofascial release techniques on improving function and reducing pain in chronic whiplash associated disorder. There are many studies in the literature currently touting the benefits of multidisciplinary approaches, especially those integrating active therapies into the treatment of chronic neck pain. Robert Teasel et al. state in a systematic review “based on the available evidence, exercise and mobilization programs have the strongest

supporting evidence for treatment of acute and chronic WAD” then go on to say that various protocols require more research to assess their relative effectiveness. (6, p. 1) It seems logical that applying a variety of approaches would have the best results in rehabilitation of chronic injuries, and yet to find the most efficient and cost effective integrated approaches it also makes sense to explore the effects of various modalities independently of one another to assess relative strengths and weaknesses.

This study focuses on the effects of myofascial release. Fascia is continuous with ligaments, joint capsules and the outer layer of the periosteum. It is a connective tissue that unites all aspects of the musculoskeletal system. (10) According to Luigi Stecco, these structures as a whole can be considered as a ‘fascial system’ that reciprocally influences all other components of the fascia throughout the body. (10, p.19) The properties of this connective tissue provide both stability to the structure of muscles and fluidity to their movements. (10) Fascia is plastic but also malleable and tends to modify its consistency when acted upon by external stimuli. (10, p.19) When subjected to repeated physical stressors or injury, fascia modifies the mesh of its fibres becoming more rigid and plastic than fluid and elastic; it becomes denser and the collagen fibres in its matrix align irregularly. (10, p.19) With regular physiological movement following trauma, the collagen fibres realign in a functional manner. However in the presence of chronic pain and/or immobility due to injury, postural compensations may prevent the collagen from realigning in a way that optimizes muscular glide. (10, p. 80) Fascial manipulation can be applied in this case to encourage fibers of the fascia to modify their function from that of plastic and supportive to elastic and fluid once again. (10, p. 80)

Trigger points are a major source of muscular pain that can be caused by repetitive strain due to chronic overuse of or acute injury to a muscle. (11) An active trigger point is defined as a painful, taught band in a muscle that causes a specific referral pain pattern. (11) A latent trigger point also originates from a taught band of muscle, is experienced as a tightness and/or shortening of a muscle but pain is not noticed until pressure is applied to the area. (11) Both types can cause significant dysfunction in muscle movement. While the initial pain of an active trigger point may subside with rest and rehabilitation, it can exist in latent form for some time unnoticed by the patient until a stressor, such as over-taxing the muscle, occurs. As Travell and Simons state “Pain symptoms disappear but occasional reactivation of the trigger point...can account for a recurrent history of painful episodes of the same pain over a period of years.” (11 p. 20) Thus the pain experienced due to an injury, such as whiplash, may have subsided in the weeks following the injury but may appear again in a chronic, recurring pattern.

In whiplash-associated disorder of the neck, the main source of chronic pain is attributed to cervical facet joint irritation, with cervical ligament and muscle strain as contributing factors. (2) Hunter et al. state “the cervical facet joints are responsible for a substantial portion of chronic neck pain” and can cause referral pain overlapping myofascial and diskogenic pain patterns (2 para. 4). Muscles often respond to strain and ligament and joint sprain by contracting to “splint” or support the injured tissues. (4) When inflammatory processes continue long term or if the muscles remain splinted after the initial injury is resolved, this can lead to continued muscle pain. (2) An external stimulus in this case is required to encourage this entire tissue system-- muscle, ligament

and periosteum--to release its splinting or holding pattern and return to normal function.

(10) In reference to the discussion above on fascia, muscle, bone and ligaments are surrounded by and bound to one another by the fascial system (10) and therefore treating the fascia is a logical approach in the restoration of function to this system.

HYPOTHESIS

The hypothesis this study puts forward is that myofascial release and trigger point therapy are effective techniques for reducing pain and increasing range of motion in chronic whiplash associated disorder.

METHODOLOGY

The model chosen for this purpose is that of a single-subject case study in which the researcher and the examiner/therapist are one and the same. The experiment is comprised of ten, 90 minute massage therapy sessions with an initial assessment done at the time of the 1st treatment and reassessments done at the 4th, 7th and 10th treatments. The assessment measures include direct and indirect tools and questionnaires used to collect data on pain, dysfunction and range of motion.

Subject

The subject is a 36 year old female who is a teacher and the mother of a toddler. She has no known allergies, no history of surgery and her activity level would be rated as low. Her complaint at the first treatment was left neck and shoulder pain with mild

tension headache which has been recurring since a motor vehicle accident 7 years previously. The subject was hit from the side by a scooter while riding her bicycle and was thrown from the bike, landing on the asphalt on the left shoulder, neck and upper back*. NSAIDS and acetaminaphen were taken during the acute phase and the subject received physiotherapy and massage therapy beginning shortly after the accident which continued on a weekly basis for several months afterward. After ceasing these regular treatments for a few months, the chronic neck pain symptoms began. The subject has been receiving massage therapy treatments every six weeks for the past 6 years and claims the discomfort can sometimes become unmanageable if the neck goes untreated for a period longer than six weeks. The usual therapy received is a combination of level 1-4 joint mobilizations to the cervical vertebrae and soft tissue manipulation of neck, shoulder and upper back muscles. Subject had last received massage treatment from her regular therapist four weeks prior to beginning this case study.

* Note: While the subject was involved in a MVA with complications beyond a conventional side-impact collision as described in the definition of acceleration-deceleration injury, she exhibited symptoms in line with the acute, subacute and chronic phases of whiplash-associated disorder.

Assessment Tools:

The Neck Disability Index and McGill Pain Questionnaire were used at the 1st and 10th sessions to assess the subjective symptoms of functional disability and pain level, respectively.

A goniometer was used to obtain base measures of cervical spine range of motion before and after the 1st, 4th, 7th and 10th treatments. Measures included degree of left and right lateral flexion, left and right rotation, flexion and extension.

TREATMENT

The subject was treated in the prone position for the first half hour of each session and in supine for the remaining hour with the exception of treatments 5 and 6 in which the sidelying position was favoured over prone due to a sinus headache.

The first four treatments occurred one week apart while the remaining six were done two per week.

The techniques applied were limited to myofascial release and trigger point therapy. Treatment modalities and specific muscles addressed remained consistent for each session as outlined in tables 1.1, 1.2 and 2 below. The myofascial techniques used included shearing, shaping, cross-hand release, bowing, muscle separation and skin rolling. These were applied using direct and indirect methods. The amount of time spent treating each muscle with myofascial techniques varied, depending on the degree of tonicity and subjective pain present in the tissues which may have necessitated longer applications in specific areas to achieve reduction in tone and/or referral pain. Trigger points were addressed as they presented which varied from session to session. A trigger point was noted when the therapist palpated a taught band of muscle which caused a

defined pain referral pattern and elicited a 3 or greater on a 0-5 pain scale. Trigger points were treated using ischemic compressions and were held until a softening of the muscle tissue was noted by the therapist, the subject reported the referral pattern had receded and the pain associated with the compression had diminished to a pain scale measure of 0 or 1.

The case study protocol did not include remedial exercise or hydrotherapy as the goal was to assess the efficacy of the chosen modalities as a stand-alone therapeutic treatment.

TABLE 1.1: Myofascial Treatment: Area and Technique in Prone Postion

| Muscle/Region | Technique of myofascial release applied |
|----------------------|---|
| Upper back/neck | Superficial fascial release |
| C6/C7 level of neck | MF skin rolling |
| Levator Scapula | Bowing, ischemic compressions |
| Upper Trapezius | Muscle reshaping, shearing, intra muscular separation |
| | |

TABLE 1.2: Myofascial Treatment: Area and Technique in Supine Position

| Muscle/Region | Technique of myofascial release applied |
|--------------------------------------|--|
| Upper chest, below clavicles | Superficial fascial release |
| Platysma | crosshands |
| Scalenes (anterior/mid/posterior) | Bowing, shearing |
| Sternocleidomastoid | Stack and load, shearing, intramuscular separation |
| Semispinalis capitis/cervicis | Spreading of muscle attachments, shearing, bowing |
| Splenius capitis/cervicis | Spreading of muscle attachments, shearing, bowing |
| subocciputals | Decompression (transverse process of c1/c2/occiput |

TABLE 2: Trigger Point Treatment: Muscle and Location

| Muscle | Side of body |
|--|---------------------|
| Sternocleidomastoid- Sternal and clavicular heads | bilateral |
| Scalenes - anterior | left |
| Splenius capitis | right |
| Semispinalis capitis | left |
| Levator scapula | bilateral |
| Subocciputals | bilateral |

RESULTS

The data collected from the study has been presented in chart format in the tables below. The range of motion data has been translated into a line graph and bar graph to provide visual illustration of results.

Tables A and B show the scores for the Neck Disability Index and McGill Pain Questionnaire which were completed by the subject before the initial treatment and again two weeks following the final treatment. Included is a percentage value based on the difference between the initial and final scores.

Table C displays active range of motion data of the subject's cervical spine as measured with a goniometer before and after treatment sessions 1, 4, 7 and 10.

The tables include the amount of difference pre- and post-treatment for each measured range including flexion, extension, bilateral rotation and side flexion expressed in degrees. These results appear in a line graph format (Fig. 1). Table D compares the range of motion of the cervical spine available before the 1st treatment with that following the 10th treatment. It is expressed in degrees as well as a percentage and is displayed as a bar graph. (Fig. 2)

TABLE A: McGill Pain Questionnaire Scoring

| Initial Assessment Score /78 | Final Assessment Score /78 | Difference In Values | % Decrease In Pain Score |
|------------------------------|----------------------------|----------------------|--------------------------|
| 20 | 7 | -13 | 65% |

TABLE B: Neck Disability Index Scoring

| Initial Assessment Score /50 | Final Assessment Score /50 | Difference In Values | % Decrease In ND Score |
|------------------------------|----------------------------|----------------------|------------------------|
| 7 | 0 | -7 | 100% |

TABLE C: Range of Motion

AROM=Active range of motion.

1) Degrees Flexion AROM

| Session # | 1 | 4 | 7 | 10 |
|------------------------------|----------|-----------|----------|-----------|
| Pre treatment | 50 | 44 | 54 | 40 |
| Post Treatment | 50 | 60 | 60 | 50 |
| Degrees of change +/- | 0 | 16 | 6 | 10 |

2) Degrees Extension AROM

| Session # | 1 | 4 | 7 | 10 |
|------------------------------|-----------|-----------|-----------|----------|
| Pre treatment | 50 | 37 | 50 | 56 |
| Post Treatment | 60 | 50 | 62 | 60 |
| Degrees of change +/- | 10 | 13 | 12 | 4 |

3) Degrees Right Lateral Flexion AROM

| Session # | 1 | 4 | 7 | 10 |
|------------------------------|-----------|----------|-----------|-----------|
| Pre treatment | 20 | 20 | 28 | 20 |
| Post Treatment | 30 | 25 | 20 | 32 |
| Degrees of change +/- | 10 | 5 | -8 | 12 |

4) Degrees Left Lateral Flexion AROM

| Session # | 1 | 4 | 7 | 10 |
|------------------------------|-----------|----------|----------|-----------|
| Pre treatment | 16 | 24 | 20 | 20 |
| Post Treatment | 30 | 25 | 20 | 30 |
| Degrees of change +/- | 14 | 1 | 0 | 10 |

5) Degrees Right Rotation AROM

| Session # | 1 | 4 | 7 | 10 |
|------------------------------|-----------|-----------|----------|----------|
| Pre treatment | 50 | 35 | 60 | 63 |
| Post Treatment | 60 | 60 | 67 | 70 |
| Degrees of change +/- | 10 | 25 | 7 | 7 |

6) Degrees Left rotation AROM

| Session # | 1 | 4 | 7 | 10 |
|------------------------------|-----------|----------|----------|----------|
| Pre treatment | 50 | 40 | 58 | 58 |
| Post Treatment | 60 | 53 | 60 | 64 |
| Degrees of change +/- | 10 | 7 | 2 | 6 |

Fig. 1: Graph showing Progression of Cervical Spine ROM for Pre and Post treatment assessment

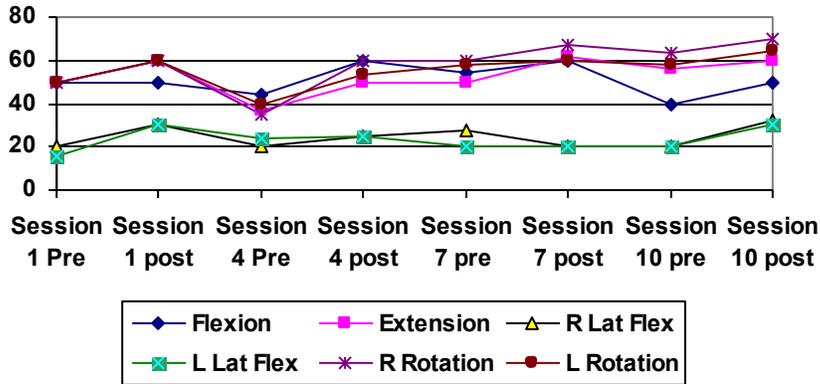
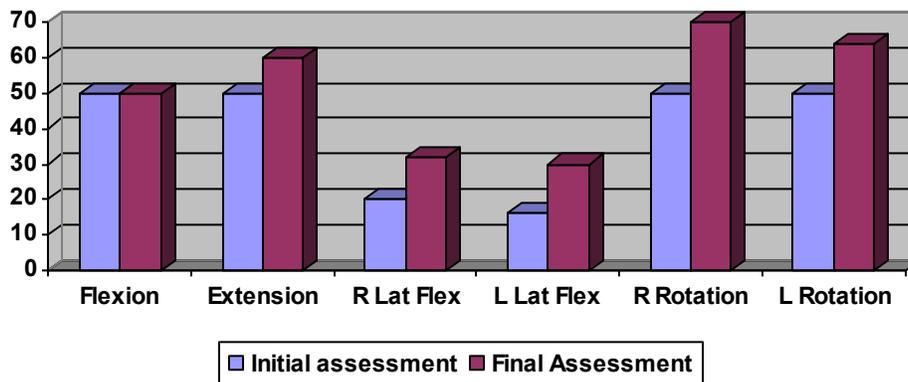


TABLE D: Comparison of AROM from Initial to Final Assessment

| AROM | Initial Assessment Range | Final Assessment Range | # Deg Difference | % Value change |
|---------------|--------------------------|------------------------|------------------|----------------|
| Flexion | 0-50 | 0-50 | 0 | 0 |
| Extension | 0-50 | 0-60 | + 10 | + 20% |
| R lat flexion | 0-20 | 0-32 | + 12 | + 60% |
| L lat flex | 0-16 | 0-30 | + 14 | + 80% |
| R rotation | 0-50 | 0-70 | + 20 | + 40% |
| L rotation | 0-50 | 0-64 | + 14 | + 28 % |

Fig. 2: Bar Graph Comparison of AROM from Initial to Final Assessment



DISCUSSION

Based on the data gathered during the 1st, 4th, 7th and 10th sessions on range of motion, there was a general continual increase in cervical active range of motion in all directions. There is outlying data for certain measurements including a negative result for right lateral flexion and no increase in left lateral flexion in the 7th session and a significant decrease in motion (>20) for neck extension, left side flexion and left rotation between the 1st and 4th sessions. At the beginning of the fourth session the subject reported having experienced neck soreness for two days following the 3rd session and a feeling of ‘uncomfortable tightness’ in the interscapular region. These factors may or may not have influenced the drastic ROM fluctuation noted at the fourth reassessment. The outlying measurements in general could possibly be attributed to human error in use of the goniometer, the therapist spending more time treating certain muscles than others and/or muscle hypertonicity due to varied stressors within the subject. Taken as a whole, from initial to final assessment, there are net AROM gains in all directions of neck movement with the lowest being a 20% gain in extension and the highest an 80% in left lateral flexion.

In comparing the Neck Disability Index and McGill Pain Questionnaire results from the initial to final assessment there are positive changes evident. The subject scored quite low on the NDI initially at 14%, however by the final assessment the score of 0/50 indicated a 100% decrease in disability. The MPQ also showed improvement in the area of pain perception with a 65% decrease in neck pain between the 1st and 10th sessions.

These results support the hypothesis of this study which postulates that myofascial treatment and trigger point therapy are effective techniques in treating

symptoms of chronic whiplash associated disorder in the neck, specifically by increasing range of motion of the neck and reducing pain perception. As outlined above, this case study has had a significant effect in both areas.

These findings have an impact on the techniques Registered Massage Therapists use to treat chronic neck pain. Anecdotally and experientially, myofascial and trigger point release are known among RMTs to have a positive therapeutic effect on neck pain; this study perhaps lends a small measure of credence to this knowledge. The results outlined in this paper will likely not change much about the way chronic WAD is treated by RMTs, however it may instil greater confidence in the efficacy of the techniques which are already being used to address this condition. Due to the apparent lack of research investigating massage as an effective stand-alone therapy in the literature and the criticism of the quality of what is available, (7, 9) having more valid research on the topic in circulation would help to inform other health care practitioners of the benefits of massage therapy in treating patients presenting with this condition.

The impact the results of this study has for the patient with chronic whiplash associated disorder is a positive one. For those who have dealt with pain and discomfort for months or years, myofascial and trigger point therapy may provide some relief of these symptoms when applied over several treatments. Further studies need to be done to assess the long term benefits of this treatment approach.

Although this study uses objective tools and measures to obtain concrete data, there is much that can be improved. Through the process of creating this report it occurs that the treatment notes and patient history could have been more thorough in helping to analyse the concrete data obtained. As well, having a more rigorous approach to the

applications of myofascial treatment would perhaps help to remove some of the bias inherent in using a technique with so many variations available and thus produce a more solid foundation for inter-tester reliability. Future research could greatly benefit from a larger sample size, a blinded model to remove examiner bias (7, 9) and assessment of the effectiveness of this treatment modality on patients with varied timelines of chronic whiplash associated disorder, for example 6 months-1 year post-injury.

CONCLUSION

In conclusion, based on the evidence presented in this paper, the initial hypothesis that myofascial and trigger point therapies can be an effective treatment for chronic neck pain due to whiplash associated disorder is supported.

This case study and others like it could be considered building blocks that contribute to forming effective treatment strategies for chronic neck disorders in the future.

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