



Clinical Case Report Competition

West Coast College of Massage Therapy

New Westminster

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Second Place Winner

Whit Truong

The effects of myofascial release (MFR) on neck pain in
an adult with forward head posture

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ADULT WITH FORWARD HEAD POSTURE

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Abstract

Background: Neck pain is among the most common physical condition requiring medical care. It has been suggested that fascial restrictions associated with neck pain could be managed through massage therapy. However, the use of massage therapy to reduce fascial restrictions in subjects with neck pain has not been studied.

Objective: To determine the effectiveness of myofascial release techniques in relieving neck pain in a 29-year old male with forward head posture.

Methods: Treatment consisted of nine 40-minute massage treatments over a 30-day period. Remedial exercises and hydrotherapy instructions were given over a 25-day period. The patient's pain was recorded using Oswestry Neck Pain Questionnaire and a Numeric Rating Scale. Forward head posture progress was evaluated by measuring the Craniovertebral Angle. A CROM goniometer was used to assess active range of motion of the cervical spine.

Results: Oswestry Neck Pain Questionnaire reflected a decrease in score, from 24% moderate disability to 16% minimal disability. Numeric Rating Scale (NRS) started at 4/10 for moderate pain and reduced to 2/10 for mild pain. The Craniovertebral Angle (CVA) increased 4° indicating a decreased forward head posture: CVA increased from 54.5° to 58.5°. Assessment of cervical spine active range of motion (AROM) with a CROM goniometer revealed: increased flexion by 15° from 60° to 75°, increased extension 10° from 60° to 70°, increased left lateral flexion 17° from 45° to 62°, right lateral flexion, and left and right rotation remained the same at 80°, 50° and 50°, respectively.

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Conclusion: This study suggests that myofascial release accompanied with hydrotherapy, and postural exercises may have clinical benefits for treatment of neck pain over a short-term duration. A larger trial is needed to confirm these results.

Key Words: Neck Pain, Massage Therapy, Myofascial Release, Forward Head Posture, Upper Crossed Syndrome, Postural Dysfunction

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Prevalence and Impact

Forward head posture (FHP) is one of the most common postural abnormalities identified in a clinical setting, accounting for 66% of cases (De-La-Llave-Rincon et al., 2009). Although poor posture is not a pathological entity in itself, it may be a contributor to the development of pathological conditions capable of causing pain (Hertling & Kessler, 1996, p. 571).

According to the United States Bone and Joint Initiative (USBJI) (2011), neck pain is among the most common physical conditions requiring medical care and affecting an individual's ability to work and manage activities of daily living. In recent years, 48-60% of adult persons in the United States reported experiencing neck or low back pain. The estimated annual direct medical costs for all spine related conditions for the years 2002-2004 were \$193.9 billion, with \$30.3 billion estimated as the incremental cost directly related to spine pain. About a third of all massage treatments in the US are for neck and back pain (Cherkin et al., 2011).

Introduction to Myofascial Pain

The myofascial system interacts with the articular system, connective tissue, and neural system. Therefore, any dysfunction in any of these components will result in a loss of dynamic stability, muscle balance and ultimately manifest itself as a source of musculoskeletal pain (Lindsay & Robertson, 2008, p. 114). However, recent literature has shown that fascia itself can be a source of nociception. Studies claim that free nerve endings in fascia contain receptors for substance P, which are commonly assumed to be nociceptive (Schleip et al., 2010). Typically, myofascial pain is characterized by a chronic deep, dull ache in the affected muscle with increased sensitivity to pressure, and

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it is thought that an extremely high percentage of people suffering with pain, loss of motion, or both may have fascial restriction problems. Unfortunately, most of these conditions go undiagnosed (Davis, 2009, p. 90).

Pathophysiology of Myofascial Pain

According to Lindsay & Robertson (2008),

“Fascia is a tough connective tissue that spreads throughout the body in a three-dimensional web from head to foot without interruption. The fascia surrounds every muscle, bone, nerve, blood vessel, and organ of the body, all the way down to the cellular level. Therefore, malfunction of the fascial system due to trauma, posture, or inflammation can create a binding down of the fascia, resulting in abnormal pressure on nerves, muscles, bones, or organs” (p. 189).

Tightening of the fascial system is a protective mechanism in response to trauma. When fascia loses its pliability and becomes restricted, it can become source of tension to the rest of the body (Barnes, 1997, p. 232). Recent studies have shown that fascia is in fact a contractile organ, due to the presence of myofibroblasts. The contractile ability of fascia is expressed in a way that can be strong enough to influence low back stability and other aspects of human biomechanics (Schleip et al, 2007, p. 63).

According to Barnes, (1997) “fascial restrictions can create abnormal strain patterns that can crowd, or pull the osseous structures out of proper alignment, resulting in compression of joints producing pain and/or dysfunction” (p. 235). It is known that fascial restrictions and muscle imbalances around the neck can present as forward head posture (FHP), a common postural dysfunction that increases the gravitational forces on the head, leading to hyperextension of the head on the neck (Hertling & Kessler, 1996, p.

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456). Janda identified this pattern of muscle imbalance as upper-crossed syndrome. As discussed by Page et al., (2010):

“In upper-crossed syndrome, tightness of the upper trapezius and levator scapula on the dorsal side crosses with tightness of the pectoralis major and minor. Weakness of the deep cervical flexors ventrally crosses with weakness of the middle and lower trapezius. This pattern of imbalance creates joint dysfunction” (p. 52).

According to Dalton (2005), Kapandji said that for every inch of forward head posture, it could increase the weight of the head on the spine by an additional 10 pounds. “Head in forward posture can add up to thirty pounds of abnormal leverage on the cervical spine. This can pull the entire spine out of alignment” (Dalton, 2005, p. 83). Therefore, it seems plausible that people suffering from neck pain may also present with forward head posture caused by fascial restrictions.

When dealing with painful conditions associated with postural dysfunction, it is important to treat the muscle directly affected, but it is as clinically important to treat the fascial structures surrounding it, because it is fascia that ultimately determines the length and function of its muscular component (Davis, 2009, p. 89).

Research Findings

At this point in time, there is minimal published research available regarding the use of myofascial release techniques in reducing neck pain associated with postural dysfunction.

Hypothesis & Clinical Reasoning

Myofascial intervention and postural correction of forward head posture will reduce neck pain in an adult patient. Myofascial release techniques will be appropriate to

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use unless irreversible fibrotic changes have occurred, or other pathologies exist.

According to Lindsay & Robertson (2008), the state of fascia can be transformed from that of a gel-like substance (which limits movements) to a more watery, flexible solute state via therapeutic interventions (p. 181). The application of myofascial re-shaping techniques to the sternocleidomastoid (SCM) and upper trapezius will work directly with the fascia surrounding the muscles to help increase mobility in those structures.

According to Hertling & Kessler (1996), the SCM muscles are very strong, and when injured or in spasm, they will hold the neck and head in the head-forward, chin-out posture, therefore myofascial release to the SCM may help to reduce forward head posture and any related pain.

This case study will focus secondarily on postural correction and the stretching affected muscles. As Dalton (2005) states: correction of posture is the critical first step in stopping and possibly reversing decay, degenerative changes and pain (p.83).

Patient History

This case study patient is a male 29-year-old carpenter and full-time student. He is 5 foot 9 inches tall; 165lbs with an ectomorph build and leads a sedentary lifestyle. He had complaints of a low-grade, constant dull ache around the suboccipital region and bilateral mastoid attachments of sternocleidomastoid muscles. The mechanism of injury is unknown but is likely to be precipitated by postural strain to his neck from a combination of sitting at a computer desk for greater than 40 hours a week, building cabinetry on the weekends for 12-16 hours and playing bass guitar for 8-10 hours each week. His lifestyle promotes hyper-kyphosis and forward head posture. He suffers from

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approximately two tension-type headaches each month, with symptoms lasting for 2-3 hours. At the time of assessment, he was headache free, and on no medications.

Observation

A postural assessment in the anterior view revealed there was a visible fascial strain pattern creating a torsional pull of the face and neck into moderate capital extension with slight neck rotation to the right. In the lateral view, both sternocleidomastoid muscles appeared vertical in presentation instead of angling posteriorly, and the external auditory meatus was about 1-2 inches anterior to the acromion process, both indicating a moderate-severe forward head posture. There was noticeable approximation of the seventh cervical vertebrae towards the occiput, accompanied with slight hyper-kyphosis, and anterior rounding of the shoulders.

Palpation

There was restricted mobility of the fascia overlying the anterior neck and upper trapezius bilaterally. The right sternocleidomastoid (SCM) and left upper trapezius were notably hyper-toned. There was increased tenderness on palpation of the suboccipital region and bilateral mastoid attachments of sternocleidomastoid muscles, but no pain was reported.

Movement

Active range of motion (AROM) assessment of the cervical spine was conducted with the use of a CROM goniometer. No pain was reported during AROM. Details are included in Table 1 below. All passive range of motion (PROM) in the cervical spine was within normal limits and there was no pain or abnormal end-feels reported. With resisted range of motion (RRM), the patient was able to achieve a grade of 4+ with right and left

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rotation, which indicated he was able to resist moderate to strong pressure. The patient was able to achieve a grade of 4- with right and left lateral flexion, which indicated he was able to resist slight to moderate pressure, and by the final follow up treatment, he was able to achieve a grade of 4+. All other ranges were graded 5, indicating he was able to resist strong pressure.

Range	Treatment 2		Treatment 3		Treatment 4		Treatment 5		Treatment 6		Treatment 7		Treatment 8		Treatment 9	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Flexion	60	60	62	62	62	67	60	60	60	62	66	70	66	66	66	75
Extension	60	60	60	60	66	66	66	66	66	70	70	70	70	72	70	70
Left Rotation	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Right Rotation	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Left Lat. Flex.	45	45	50	60	55	50	60	60	60	60	60	60	60	60	62	62
Right Lat. Flex.	50	50	55	55	60	50	60	60	55	55	50	50	50	50	50	50

All measurements in degrees. No AROM measurements for Treatment 1

Neurological and Referred Pain

No report of neurological symptoms or referred pain patterns during this case study.

Special Tests

Special tests were performed as outlined in Table 2 below.

Region	Test	Result
Cervical	Transverse Ligament Stress	-, no neurological symptoms
Cervical	Maximum Compression	-, no neurological symptoms
Cervical	Axial Distraction	-, no neurological symptoms
Cervical	Vertebral Artery (VAT)	-, no neurological symptoms
Cervical	MMT – ant/lat neck flexors	R4- L4-, slight-mod pressure
Cervical	MMT – anterior neck flexors	4+, moderate-strong pressure
Cervical	MMT – post/lat neck extensors	R5 L5, strong pressure
Cervical	MMT – upper trapezius	R5 L5, strong pressure
Cervical	ULTT1 Median Nerve	-, no neurological symptoms
C/S, GH	Halstead's, Wright's	-, no neurological symptoms
Cervical	Translations to C4-C6	restricted to R, neck in sl flexion

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Treatment Goals

The aims of the treatments were to increase fascial mobility overlying the sternocleidomastoid and upper trapezius muscles, as well as to increase AROM of the cervical spine, with the use of myofascial re-shaping and shearing techniques, translations and PROM, respectively. As a result of increased fascial mobility and cervical spine AROM, it is likely that there would be an increase in muscle length and subsequently, a decrease in hyper-tonicity of affected muscles. Both treatment goals would ultimately address the patient's goal of decreasing pain in the suboccipital region and bilateral mastoid attachments of sternocleidomastoid muscles.

Treatment Protocol

Treatment protocol consisted of nine, 40-minute treatments, over a 30-day period. Remedial exercises and hydrotherapy program were given over a 25-day period. Treatments 1-2 differed from treatments 3-9 in that more time was focused on warming up the tissue due to patient discomfort from muscle spasms in the neck. Treatments 3-9 were similar in almost all aspects.

The main treatment modality selected for this case was myofascial release, and the two techniques used were re-shaping and one handed shearing. Other accessory modalities such as Swedish massage, joint play, PROM, and passive static-progressive stretching were also administered.

A typical forty-minute treatment consisted of the following:

1. Introductory PROM to the cervical spine with one hand fascial shearing and blocking to the clavicle. Slackening of the upper trapezius with a static hold of the muscle belly, followed by myofascial re-shaping of the

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upper trapezius was performed bilaterally, but with more of a focus on the left. Then slackening of the SCM with a static hold of the muscle belly, followed by myofascial re-shaping was performed bilaterally, but with more of a focus on the right.

2. Passive range of motion to the cervical spine was done, with lateral and anterior cervical translations at the level of C4-C6
3. General Swedish massage to the entire neck to clear.
4. Passive static-progressive stretching to bilateral sternocleidomastoids, and upper trapezius muscles were administered to maintain any new ROM achieved through MFR and joint play techniques.
5. Finish with Swedish massage to clear and to promote venous return.

Hydrotherapy

To increase the extensibility of contractile muscle tissue, the patient was instructed to make use of the microwavable heating pad that he owned.

Description: Heat application to posterior neck and upper trapezius.

Frequency: 1x/day, everyday before stretching.

Intensity: As per the products heating instructions and patient's tolerance.

Duration: 10-20 minutes, maximum 30 minutes.

Remedial exercise

As a part of a re-training program directed towards pain relief, the patient was given static progressive stretches and postural exercises to perform at home.

To help normalize hypertonic muscle tone, the patient was instructed to stretch tight neck muscles in a static progressive manner after application of 10-20 minutes of

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heat to the posterior neck region. The patient was shown proper diaphragmatic breathing procedures and was instructed to practice deep breathing while stretching.

Muscles: Clavicular head of sternocleidomastoid (SCM), and upper trapezius

Description: The neck stretches were easy to perform and required no additional equipment.

- Clavicular head of SCM: contralateral side bend, ipsilateral rotation, and slight cervical extension.

- Upper Trapezius: full cervical flexion, contralateral side bend, and ipsilateral rotation with slight overpressure.

Frequency: 1x/day, everyday.

Intensity: Slowly and gently, move joint to the where tissue resistance begins, maintain position in a pain free range until a degree of relaxation is felt, then lengthen and maintain the muscle in the new pain free end range.

Duration: 15 second hold in first barrier, then 15 seconds in the second barrier, up to a total of 1 minute for bilateral stretching.

In order to re-train neurological pathways, the patient was instructed to perform postural exercises after the stretches consisting of chin and scapular retractions with isometric holds.

Description: Standing with back flat against a wall with flexed knees.

- 1st set: chin retractions.

- 2nd set: chin and scapular retractions with GH and elbow joints at 90 degrees.

- 3rd set: chin and scapular retractions, ending with a suboccipital stretch held for 15 seconds on the last repetition.

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Frequency: 1x/day, everyday.

Intensity: Neck is relaxed during maintained capital flexion, and then with moderate amount of pressure, the neck is pulled posteriorly until head is flat against the towel and wall.

Duration: 3 sets of 15 reps with 2-second isometric holds between repetitions, total of 2 minutes.

Treatment Results and Analysis

Oswestry Neck Pain Questionnaire

An Oswestry Neck Pain Questionnaire was given to the patient prior to the first and after the last treatment. In the first questionnaire all ten sections were completed and the patient scored 24% (12/50). In the last questionnaire, again all ten sections were completed and the patient scored 16% (8/50). The patient went from what is considered moderate disability to minimal disability after nine treatments. According to the Oswestry Neck Pain Questionnaire,

Treatment 1 24% Moderate Disability: This group experiences more pain and problems with sitting, lifting, and standing. Travel and social life are more difficult and they may well be off work. Personal care, recreation, and sleeping are not grossly affected, and the neck condition can usually be managed by conservative means.

Treatment 9 16% Minimal Disability: Can cope with most ADLs. Usually no treatment is needed, apart from advice on lifting, sitting, posture, physical fitness and diet. In this group, some patients have particular difficulty with sitting and this may be important if their occupation is sedentary.

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Numeric Rating Scale (NRS)

A Numeric Rating Scale Questionnaire was given to the patient prior to the first and after the last treatment. The NRS was used to determine the amount of pain the patient was experiencing in the suboccipital region and bilateral mastoid attachments of the SCM. No pain is represented as 0, and worst possible pain is represented as 10.

Treatment 1 scored 4/10 for moderate pain, and treatment 9 scored 2/10 for mild pain.

Assessment of Forward Head Posture: Craniovertebral Angle (CVA)

A photograph of the lateral view of the patient was taken at the end of all nine treatments. Once all photos were obtained, they were scaled to the same size and the Craniovertebral Angle was determined by measuring the angle between the horizontal line passing through C7 and a line extending from the tragus of the ear to C7. The first measurement of the CVA was taken using a goniometer to establish a baseline measurement. The Craniovertebral Angle (CVA) increased 4° indicating a decreased forward head posture: CVA increased from 54.5° to 58.5°.



Figure 1. Photo: Craniovertebral Angle of Treatments 1-9

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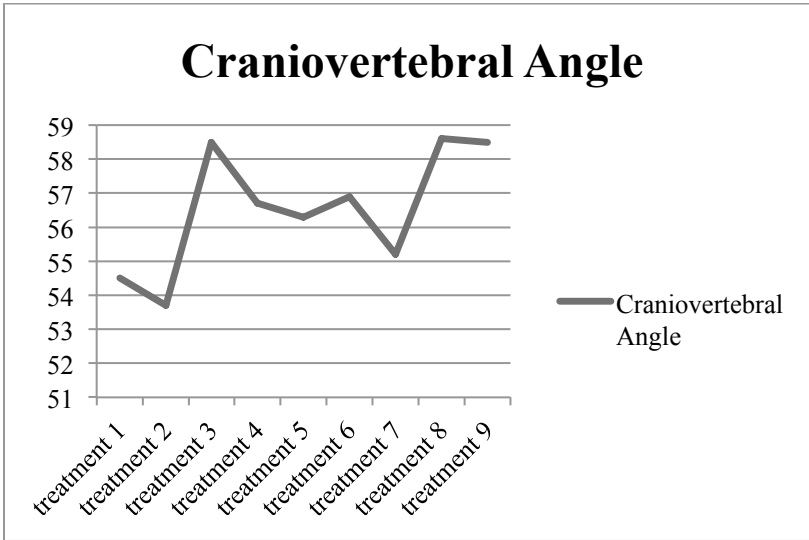


Figure 2. Graph: Craniovertebral Angle of Treatments 1-9 measured in degrees

AROM Assessment of C1-C7 with CROM Goniometer

The figure below contains data extracted from “Table 1: Active ROM of C1-C7 with CROM Goniometer” found in the *Methods* section. Assessment of cervical spine active range of motion (AROM) with a CROM goniometer revealed: increased flexion by 15° from 60° to 75°, increased extension 10° from 60° to 70°, increased left lateral flexion 17° from 45° to 62°, right lateral flexion, and left and right rotation remained the same at 80°, 50° and 50°, respectively.

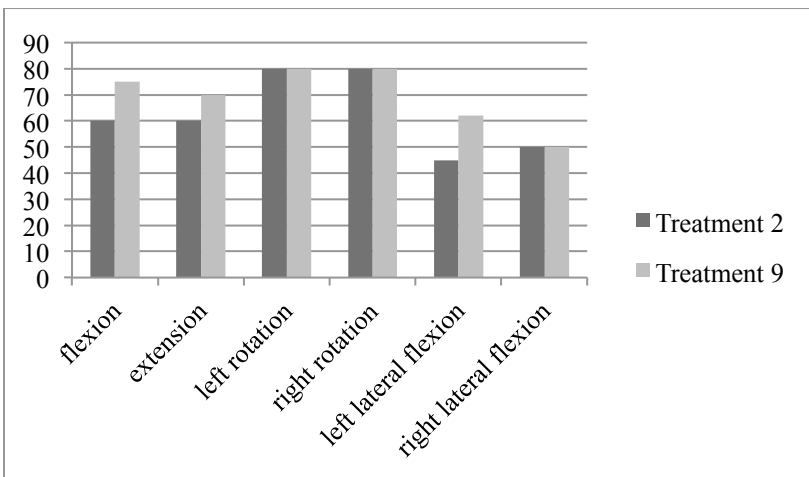


Figure 3. Graph: Comparison of Initial and Final Post Treatment AROM

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Palpation Re-assessment

An “around the clock” hands on palpation re-assessment of the fascia was conducted on the final treatment, and there was no marked increase in fascial mobility overlying the anterior neck and posterior neck region. From a subjective point of view, the fascial tissue remained as restrictive as it did in the initial treatment. As the case study progressed, the hyper-tonicity of the right SCM and left upper trapezius decreased, and by the final treatment there was minimal tenderness reported over the suboccipital region.

Photographs

Photographic comparisons showing a decreased forward head posture in various views.



Figure 4. Treatment 1 and 9 Close Lateral View Comparison

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Figure 5. Treatment 1 and 9 Far Lateral View Comparison



Figure 6. Before and After Seated Posture

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Discussion

With regards to methods for assessment, specifically, the Craniovertebral Angle (CVA), future case studies would benefit from instructing the patient to visually focus on a point on the wall directly in front of them. CVA assessment while the patient is seated in a chair or standing against a wall might also minimize the tendency towards flexion or extension of the neck and trunk. As for AROM measurements of the cervical spine with the CROM goniometer, in order to increase the reliability of the data, measurements for each direction should be repeated at least 3-5 times and the mean value should be calculated to reflect the average ROM for each direction. The calculation of the Craniovertebral Angle and use of the CROM goniometer are both subject to human error, therefore the data presented in this case study may not accurately represent the true resting angle of the neck or range of motion.

With regards to treatment techniques, future case studies would benefit from including proprioceptive neuromuscular facilitation, such as contract relax, which is considered a slightly more aggressive form of stretching than static-progressive, but however can be faster and more effective in elongating contractile tissue when performed correctly. Incorporating sensorimotor training (SMT) of the cervical spine may also be beneficial. Using an exercise ball against a wall or according to Janda any unstable surface such as foam pads or balance boards help elicit automatic stabilizing reactions that cannot be trained voluntarily. SMT may be helpful in improving movement patterns when dealing with postural correction as it addresses the central nervous system rather than the muscle imbalance itself.

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Conclusion

The primary objective of this study was to research the validity of myofascial re-shaping and shearing techniques in decreasing neck pain associated with forward head posture. This study suggests that the use of myofascial release accompanied with hydrotherapy, and postural exercises were effective for treatment of neck pain in a patient with forward head posture over a short-term duration. While this study was successful in achieving the intended goals, research is needed to confirm the reliability of the findings, and follow up assessment would need to be conducted in order to track the long-term effects.

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