The Effects of Massage Therapy on Chronic Neck Pain, Cervical Hypolordosis, and TSH Levels on a Woman with Hypothyroidism: A Case Study

Shila Tirabassi

shilatirabassi@gmail.com

Student at the Center for Neurosomatic Studies (CNS)

13825 Icot Blvd #604 Clearwater, FL 33760 1(800)656-1407
ABSTRACT

Background and Participant: A woman with chronic neck pain and hypothyroidism seeks massage therapy after not finding relief through chiropractic. A radiograph taken by a physician reports hypolordosis of the cervical spine. Once a competitive gymnast, the 47 year old female currently teaches dance 2-4 hours per week and is Academic Chair at a city college. Her pain is worse upon sitting at the computer which is approximately 6 hours per day.

Objectives: The purpose of this case report is to determine if structural balancing through postural analysis and massage therapy is an effective form of treatment in decreasing chronic neck pain, hypolordosis and TSH levels.

Methods and Tools: Ten massage therapy treatments were administered two times per week and treatments ranged from one to two hours in length. The focus was to analyze and balance the structure, eliminate trigger points (TrP’s), increase range of motion (ROM) and alleviate pain. A Visual Analog Scale (VAS) was given pre and post-treatments. The Neck Bournemouth Questionnaire and The Neck Pain Disability Index were given at the beginning, middle and end of the report. Tools used included charts, plumb bob and goniometer for evaluating posture and testing ROM. Blood tests for T4 and TSH levels were taken pre and
A rolled hand towel was used to support the cervical lordotic curve during treatments and at home while sleeping.

Results: Pain levels dropped as displayed by the VAS scores and ROM increased. Radiograph images denote an increase in lordotic curve in the cervical spine. TSH levels dropped denoting an increase of thyroid activity.

Conclusion: The use of massage therapy has shown to be an effective form of treatment in one individual with chronic neck pain, hypolordosis and hypothyroid. More research is warranted to further investigate short and long term effects of Massage Therapy in patients presenting these symptoms particularly the long term effects of massage therapy on the thyroid.

KEY WORDS

Neck pain, massage, cervical hypolordosis, hypothyroid

INTRODUCTION

It has been estimated by the Centers for Disease Control and Prevention that 22.9% of the female population ages 45-54 experienced neck pain in 2011.(1) Although neck pain is multifactorial in etiology, inconclusive evidence suggests a
relationship between neck pain and high stress job demands.(2) Computer usage in particular contributes to work related musculoskeletal disorders, repetitive stress injuries and neck pain.(3)(4)

Workplace ergonomics play a key role in the development of pain and dysfunction.(5) “Sitting tall” is the first step in learning how to sit properly.(6) This is accomplished by extending the lumbar spine in the area of lordosis in order to experience a straight back, as opposed to slouching. Within the relationship between the lumbar and cervical postures during sitting, it is found that lumbar extension increases cervical flexion which could be a precursor to neck pain.(7) Normal cervical lordosis is approximately 30 degrees and neck pain has been associated with cervical lordosis of <20 degrees.(8)

The deep cervical flexors (longus coli and longus capitis) have a major postural function in supporting the neck and if hypertonic can straighten cervical lordosis.(9) In the event of chronic hypertonicity and trigger points (TrP’s), ischemia will be present as well. Ischemia is a restriction in blood supply to a gland, tissue or organ causing a shortage of oxygen and glucose needed for cellular metabolism. Conversely any gland, including the thyroid can be a major contributor to musculoskeletal dysfunction and can encourage the presence of TrP’s.(10) This can also be viewed as a viscerosomatic reflex which involves reflex actions through the central nervous system between visceral and somatic
tissues. Sensory signals from tight muscles may “spill over” in the spinal cord to afferent signals associated with organ or glandular function.(11)

The thyroid produces T3 and T4 and in normal functioning is part of a feedback loop with the pituitary gland. The pituitary detects the levels of T3 and T4 in the bloodstream and signals TSH to regulate the thyroid. Although other variables like age and race are factors, generally low levels of T3 and T4 will denote higher TSH scores and vice versa.(12)

The purpose of this case report is to determine if structural balancing through massage therapy is an effective form of treatment for an office worker with chronic neck pain, cervical hypolordosis and hypothyroidism.

METHODS

Ten massage therapy treatments were given in a five week period. The subject was treated two days a week and treatments ranged from one to two hours. Each treatment began with an extensive charting of posture in standing, sitting and supine. The postural assessment determined the relative bilateral inferior/superior positioning of the temporal bones, occiput, acromion processes, clavicular heads, greater trochanters, anterior superior iliac spines (ASIS), posterior superior iliac spines (PSIS), tibial tuberosities and heel pads in the
coronal plane. Measurements were also taken in the transverse and sagittal plane to determine the relative anterior/posterior sheer and/or rotation of the same mentioned landmarks as well as obliquity (inflare/outflare) of pelvis, obliquity of temporal bones, pelvic anteversion and anteversion of the temporal bones. The positioning of C1 and C2 were measured and charted in all three anatomical planes as well as the relative alignment of the cranial bones.(13)

The initial treatment included Neck Bournemouth Questionnaire and The Neck Pain Disability Index Questionnaire.(14)(15) These questionnaires were repeated at the mid-point and at the end of the 10 treatments. Additionally, range of motion (ROM) in lateral tilt and rotation was charted using Goniometry of the Cervical Spine before the first treatment and both before and after the last treatment.(16) Each treatment began and ended with a visual analog scale (VAS) and blood test results were collected pre and post-report for activity of the thyroid. Additionally, the patient was asked to sleep with a rolled hand towel under the back of the neck to support the natural lordotic curve of the cervical spine.

Client Profile

The subject is a 47 year old female 5’½” and 125 pounds. She is the Academic Chair for the Department of Humanities and Fine Arts at a City College and was formally a competitive gymnast ages 8-13. In the last 5 years, the subject has transitioned from teaching dance 3-6 hours per week with 2 hours of
computer work per day, to teaching dance 2-4 hours per week with 6 hours of computer work per day. Since this change towards more sedentary behavior, the subject experiences pain she describes as “aching, distracting and sometimes throbbing” on a daily basis. According to the subject, the pain has decreased her cervical range of motion (ROM) in lateral tilt and rotation. The pain is local and slightly more intense on the left posterior side of the neck. Before treatments began the subject rated the pain an 8 out of 10 (8/10) on the VAS.

Three years of chiropractic treatments every 3 weeks gave the subject very limited results. Hot baths along with lying flat on the floor helps. Working on the computer makes the subject’s neck pain feel much worse. The subject finds it a necessity to take one to two doses of NSAIDs every work day to alleviate the pain, which in turn increases her ability to focus.

The subject has been diagnosed by a doctor with arthritis, degenerative disc/joint disease at C4/5, C5/6, C6/7, L3/4, L4/5, and L5/S1, cervical hypolordosis and lumbar scoliosis. Spondylosis was noted at C4/5, C5/6 and C6/7.

The subject’s blood report denotes low thyroid T4 count of .70. T3 and TSH were both on the low end of normal range. In addition to taking NSAIDs, the subject takes a thyroid supplement as well as administering a hormone replacement therapy patch.
Treatment Plan

The subject’s initial goal was to alleviate neck pain. An x-ray from the lateral view showed cervical hypolordosis. Each treatment began with a postural chart which took approximately 15 minutes and treatments were based upon these charts. VAS scores were taken at the beginning and ending of each treatment. The first and last treatments began with documenting ROM in lateral flexion and rotation using Goniometry of the Cervical Spine.(16) Blood was drawn pre and post-report for TSH activity.

Sherrington’s law of reciprocal inhibition states that when agonist muscles are lengthened, their antagonist will shorten.(17) In order to restore normal lordotic curvature and reduce pain, structural balancing necessitated the release of hypertonicity in the deep cervical flexors. Therefore skin rolling the platysma and frictioning the deep cervical flexors were performed in the 1st treatment.

Anteversion of the pelvis was addressed in the 2nd treatment. The angle between ASIS and PSIS increases with lumbar lordosis.(18) The patient presented 19 degrees of anteversion measured from the PSIS/ASIS angle therefore psoas, iliacus and rectus femoris were treated using friction, static compression and longitudinal gliding strokes respectively. Further investigation of hypertonic muscles contributing to pelvic anteversion found that quadratus lumborum and tensor fasciae latae were both hypertonic. Quadratus lumborum was treated using
small unidirectional frictions strokes along the 12th rib, spinal and ilium attachments. Tensor fasciae latae was treated using static compression.

The quadratus lumborum treatment was repeated in the 3rd treatment to address lumbar lordosis. The left upper trapezius was treated using uncoiling and pincer compression of the nuchal ligament as the left shoulder was the superior side of a lateral shoulder tilt and the left occiput was inferior. The left splenius capitis was treated with static pressure along the spinous processes to increase ROM in left cervical rotation. The left piriformis was treated with small friction strokes to address the anterior projection of the left ASIS as seen in the postural chart.

Balancing the cranium was the goal of the 4th treatment. The temporal bone, frontal bone and maxilla were all anterior on the left in supine measurements. Cranial balancing was performed by guiding the bones through holding for 8 seconds with constant pressure in the direction of structural balance.(19) Myofascial techniques in the general area of the temporal bones preceded this treatment which included hair pulling, ear traction with rotation, and spreading of the masseter and temporalis.(20)

In the 5th treatment, circumduction with tractioning of the cervical spine revealed referrals patterns commonly seen in the scalenes. Scalenes were palpated and treated bilaterally with static compression and TrP therapy.(21) The TrPs
created a twitch response in the shoulders bilaterally. Also in this treatment, the left pelvic obliquity was addressed by frictioning the right iliacus with small for the inflare and by gliding the attachments of the left gluteus maximus on the femur for the outflare. The pelvic obliquity treatment concluded with mobilizing the pelvis with lateral rocking emphasizing right pelvic outflare and left pelvic inflare. (22) Anteversion of the pelvis was treated unilaterally on the more flexed, left innominate side by releasing of psoas with static compression along with frictioning the left quadratus lumborum attachments. The right pectoralis major and the left upper trapezius were both treated using compression with oppositional frictioning and uncoiling to address the right shoulder tilt. The deep cervical flexor treatment was repeated bilaterally with TrP therapy.

The focus of the 6th treatment was to continue to balance the structure. Pelvic anteversion, lateral pelvic tilt, lateral shoulder tilt and spinal dysfunction were all examined and treated. The iliacus was treated bilaterally for the high degree of pelvic anteversion. Also for the anteversion, interspinales of the lumbar spine was treated. This was done by first placing a pillow under the subject’s abdomen to open the space between the spinous processes followed by frictioning interspinales with a massage star point. The right gluteus medius and minimus were treated with friction strokes and TrP therapy to address the posterior pelvic projection and the approximation of the ASIS and greater trochanter on the same side which presented as a lateral pelvic tilt. The right shoulder tilt was treated
with uncoiling and gliding strokes of latissimus dorsi and teres major. The left levator scapula was also treated for the high shoulder tilt with glides and specific friction strokes at the spinal and scapular attachments. The erector spinae was treated for scoliotic and lordotic curves with longitudinal glides, and more specifically with frictions of attachments, one inch lateral scoops in the lamina groove of the lumbar spine and static compression. Bilateral TrP therapy for the deep cervical flexors was repeated. Also in this treatment, pincer compression of the left sternocleidomastoid was done to address right lateral head tilt with left rotation.

A large part of the 7th treatment was devoted to releasing bilateral scalene TrPs in sidelying which manifested again with a twitch response in the shoulders. Infrahyoids were treated with TrP therapy and small friction strokes to address the possible somato-visceral reflex to the thyroid. The origin of sternohyoid and sternothyroid were treated with one inch lateral scoops on the posterior aspect of the manubrium.

Treatment #8 began with a different approach to the scalenes. Again they were creating a twitch response and TrP therapy was not eliminating them completely so myofacial release was administered bilaterally along the lateral neck.(20) Platysma, infrahyoids, suprahyoids and deep cervical flexors were all examined for TrP activity. Bilateral flexion of the pelvis was addressed with
scoops and static pressure of iliacus. The left lateral shear of C1 was corrected with static pressure on the left lateral tip of the transverse process of C1 by stabilizing it as the patient sheared her head to the left. Circumduction with traction of the cervical spine was performed again. Tapotement of the thyroid cartilage was given in the final three sessions and also given as a self-treatment to do at home for at least one minute, two times per day. In this technique the thyroid was tapped bilaterally with fingertips in one second intervals. This repetitive sending of vibration was thought to facilitate nervous input to the thyroid and perhaps serve to increase its’ function.

It seemed as though noxious proprioception was originating from the scalenes due to persistent TrPs. Therefore the 9th treatment began again with TrP therapy along the anterior scalene. The skin rolling of platysma preceded the treatment of rectus capitis anterior. Treating rectus capitis anterior was performed with 3 small friction scoops by displacing the trachea laterally to access C1 anteriorly. The dura mater was tractioned with compression and decompression. This was executed by pulling the cranium cephalad for 3 seconds to create a distractive pressure on the dural tube, followed by 3 seconds of caudad pressure on the crown of the head and rhythmically repeating. This technique corrected the right anterior temporal bone distortion. For the high side of the lateral shoulder tilt, the left upper trapezius was treated with uncoiling and the left teres major was treated with compression and frictioning. The erector spinae of the lumbar spine
was treated bilaterally with 5 inch longitudinal glides, 1 inch lateral scoops in the lamina groove and frictioning the attachments on the transverse processes.

The 10th and final treatment focused on the site of pain locally primarily in the neck and shoulders. TrPs were again examined and treated with static pressure in the anterior and middle scalenes bilaterally. The right lateral shoulder tilt was addressed by treating the left upper trapezius with pincer compression and uncoiling. The shoulder tilt along with left torso rotation was addressed by treating the right pectoralis major with pincer compression, pin and stretch and frictioning of the attachments at the sternum. The left latissimus dorsi and teres major were also treated with pincer compression, uncoiling and static compression on the origin of teres major. Splenius capitis was treated on the left side with static compression along the spinous processes to address the limited ROM in cervical rotation. Again, the deep cervical flexors were treated bilaterally with small friction strokes and the treatment was completed with tapotement of the thyroid.
RESULTS

- The Neck Pain Disability Index showed a decrease of 18 points. The Neck Bournemouth Questionnaire decreased 36 points (Fig. 1)
- According to the patient, the use of NSAIDs was reduced by 50%
- The VAS went from 4.5/10 pre-treatment and 2/10 post-treatment in treatment #1 to 2/10 pre-treatment and 0/10 post-treatment in treatment #10 (Fig. 2)
- The radiograph showed an increase of cervical lordosis (Fig. 7-8)
- The TSH levels dropped from 1.20 to .431 indicating more adequate release of T3 and T4 into the bloodstream
- The subject’s ROM increased 11 degrees in lateral cervical flexion to the right and a 1 degree increase to the left
- The ROM in cervical rotation increased 10 degrees to the right, maintained the same ROM to the left, which was in normal range

Although slightly above normal range, discrepancy of pelvic anteversion on the right and left innominate halves balanced by the 10th treatment. The temporal bones balanced in standing by the 6th treatment and the occiput balanced in supine by the last treatment. Temporal and pelvic obliquity completely balanced in standing by the 10th treatment. Although rotation of the shoulders, torso and pelvis persisted as indicated by the dots on the chart, the cranial rotation
did eventually balance by the last treatment as did lateral flexion of the cervical spine in supine. ASIS, PSIS and greater trochanter measurements also balanced in standing and supine by the final treatment (Fig. 4-6).

**DISCUSSION**

The increase in the subject’s pain in the last five years coincided with a more sedentary work regimen. Paralleled with this change was an increase of hypothyroidism. A viscerosomatic reflex arc in which the sensory signals from the hypertonic cervical flexors interfering with afferent signals associated with thyroid function may have played a key role in the hypothyroidism.(11) The lack of cervical lordosis was part of the reasoning behind balancing the structure which showed to have an effect on homeostasis of the thyroid. ROM increased by the end of the report as did the lordotic curve bringing the cervical spine and therefore the entire structure towards balance.

Unnecessarily straightening the primary and secondary curves of the spine could be a result of common directions like “sitting tall”. This is seen particularly in certain groups like gymnasts where lumbar hyperlordosis is predisposition.(23) The subject was a competitive gymnast ages 8-13 and has been involved in dance and gymnastics ever since. She also has increased lordosis in the lumbar spine. A
study that rated the injury-proneness of gymnasts pointed out that one of the five major factors of predicting injury was the prevalence of hyperlordosis of the lumbar spine. The findings supported past research in that hyperlordosis in gymnasts could preface future spinal injury.\(^{(23)}\)

This trend of increased lumbar lordosis coupled with decreased cervical lordosis is commonly seen in seated positions.\(^{(7)}\) Lovett Reactor states that the upper and lower segments of the spine should have a similar relationship and further studies have shown that this relationship also exists between the cranium and pelvis.\(^{(24)}\) This guided the treatments into an approach that included the balancing of the lumbar spine, pelvis and cranium. Conversely, Sherrington’s law of reciprocal inhibition states that when agonist muscles are lengthened, their antagonist will shorten.\(^{(17)}\) Reciprocal inhibition was taken into account and used in the treatment planning as in the case with the hypertonicity of the deep cervical flexors.

These principals and neurological laws were a large part of the treatment planning, in particular in the quest for homeostasis of the thyroid. The TSH levels decreased from 1.20 to .0431 which is an indication that T3 and T4 secretion into the bloodstream increased.\(^{(12)}\) Because T3 levels were in normal range, T3 was not taken in the post-report blood work. This is unfortunate because the T4 level dropped .03 points. Having both T3 and T4 numbers post-report would have been
a more thorough way to measure thyroid activity, however lower TSH levels were very much welcomed. A follow up report would be warranted to monitor the activity of T3, T4 and TSH for long term effects of massage therapy on the thyroid.

According to Thieme’s Atlas of Anatomy, normal ROM for lateral flexion is 35 degrees and for rotation is 50 degrees.(25) As indicated by the subject, the presence of pain decreased her cervical ROM in rotation and lateral flexion therefore these two motions were documented before the first and last treatments. Lateral flexion increased 11 degrees on the right and 1 degree on the left leaving the patient at 29 and 19 degrees respectively. More work on eliminating TrPs in the scalenes could further improve the degree of lateral cervical flexion. Although not deficient in rotation to begin with, the subject’s rotation increased 10 degrees to 63 on the right and maintained its ROM of 50 degrees on the left, which is within normal range (Fig. 3).

The work schedule of an Academic Chair follows the academic calendar. The initial interview and measurements showed more dysfunction, as the school term was coming to an end. The pain began at 8/10 and had usually been at that level for the past 5 years, particularly when school was in session. During the arranging and scheduling of the case report the subject had a three week holiday in which the pain reduced. The first treatment showed only 4.5/10 on the initial
pre-treatment VAS presumably due to the three week holiday in which time working on the computer was less. An improvement in the design of the report would be to avoid any unforeseen disruptions of daily living activities. More specifically, the entire period of the project should have taken place in the middle of a school term as opposed to the very beginning of a term, where there was a three week break immediately prior. The last three post-treatment VAS scores dropped to 0/10.

**Conclusion**

The use of massage therapy has shown to be an effective form of treatment in one individual with chronic neck pain, hypolordosis and hypothyroidism. More research is warranted to further investigate short and long term effects of Massage Therapy in patients presenting these symptoms particularly the long term effects of massage therapy on the thyroid.
Fig. 1 Pain Questionnaires

![Pain Questionnaires](image)

Fig. 2 Visual Analog Scale

![Visual Analog Scale](image)
Key to Fig. 2  Visual Analog Scale

<table>
<thead>
<tr>
<th>Treatment #</th>
<th>Pre-Treatment VAS</th>
<th>Post-Treatment VAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>4.5</td>
<td>2.5</td>
</tr>
<tr>
<td>2</td>
<td>5.5</td>
<td>1.25</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>1.5</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>0.5</td>
</tr>
<tr>
<td>5</td>
<td>2.25</td>
<td>0.5</td>
</tr>
<tr>
<td>6</td>
<td>2.5</td>
<td>0.5</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>
Fig. 3  Range of Motion of the Cervical Spine

ROM of the Cervical Spine

- Rotation Right
- Rotation Left
- Lateral Flexion Right
- Lateral Flexion Left

Normal Range
Pre-Treatment #1
Pre-Treatment #10

Degrees
Fig. 4  Treatment #1

NAME: [Redacted]
DATE: 1/21/14

POSTUROLOGY CHART

L: Meniscus Sx early 90s
Osgood schlatter @ Tibia

THERAPIST: [Redacted]

LLL?
Fixations?
SPM?
Demands?

Platysma tight
Infraspinous tight @ desk
1st hand across mid anterior cervical

Copyright 2013 Neurosomatic Educators Inc.
Fig. 5 Treatment #6

Tender iliacus (L) but (L) more
Tender interspinales (L) 4/5
Fig. 7 Pre-Report Radiograph

Fig. 8 Post-Report Radiograph
ACKNOWLEDGEMENTS

Thank you to the staff and students at the Center for Neurosomatic Studies for their ongoing dedication to the advancement of massage therapy research. I would like to express gratitude to Dr. Sean Woodward of Millennium Medical Institute for his generosity and expertise in radiology. I would especially like to thank Randall Clark for the mentoring during the writing of the case report and my family for being so incredibly supportive.

REFERENCES

1. Table 47. Severe headache or migraine, low back pain, and neck pain among adults aged 18 and over, by selected characteristics: US, selected years 1997-2011 - 047.pdf [Internet]. [cited 2014 Jan 15]. Available from: http://www.cdc.gov/nchs/data/hus/2012/047.pdf


24. 1044_Blum_LovettBrothers.pmd - Lovett Brothers article.pdf [Internet]. [cited 2014 Jan 26]. Available from: http://www.ethostotalwellness.com/images/Lovett%20Brothers%20article.pdf