Effects of General Swedish Massage and Myofascial Trigger Point Release on Reducing Pain Symptoms of Functional Scoliosis: a Case Study

Melody Chow

West Coast College of Massage Therapy New Westminster, Class of 17D

Date of Graduation: December 16, 2017

Author Contact Information:

Email: chowm@collegeofmassage.com

Phone: (604) 908-9087

Address: 2753 Dewdney Trunk Road, Coquitlam, BC, V3C 2H8
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Abstract

Objective: The purpose of this case study is to determine if massage therapy including General Swedish Massage (GSM) and Myofascial Trigger Point Release (MFTP) techniques will decrease pain symptoms associated with functional scoliosis presented by a female case subject.

Background: Studies have shown that symptoms associated with functional scoliosis decrease quality of life and can be life threatening. Due to irregularity in spinal curvature, muscle imbalances are developed and thus the most common symptoms are low back pain and radicular leg pain. This case study aims to treat symptoms of functional scoliosis by addressing hypertonic shortened musculature and trigger points.

Methods: A 25-year-old female participated in 6 treatments for 60 minutes consisting of 2 sessions per week for 2 weeks and 1 session per week for 2 weeks over a period of 4 weeks. GSM and MFTP were used to address shortened musculature on concave side of spinal curvature, as well as musculature with referral pain patterns presented by case subject. Assessments performed included an introductory questionnaire, postural observation, spinal joint exam, functional and special tests, Visual Analog Scale (VAS), Pain Quality Assessment Scale (PQAS), Cobb Method and grid line.

Results: PQAS journal indicated that there was significant reduction or elimination in pain levels from 6/10 to 2/10 for low back pain and 8/10 to 0/10 for radicular leg pain. The patient indicated an overall decrease of unpleasantness from 8/10 to 0/10. Lumbar spine range of motion also increased in flexion and extension.

Discussion/Conclusion: GSM and MFTP were effective in reducing pain symptoms presented by a female case subject with functional scoliosis. However, further studies with a larger sample
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size and more uniform assessment methods and treatment protocol is indicated to test for the
effectiveness of GSM and MFTP on reducing symptoms of functional scoliosis.

*Keywords: Scoliosis, Swedish massage, Massage Therapy, Trigger Point, Myofascial Trigger Point Release*
Introduction

Scoliosis

Scoliosis is defined as “a structural lateral curvature of the spine with a rotatory component” that exceeds 10 degrees of deviation (Goethem, Campenhout, Hauwe, & Parizel, 2007, p. 105). There are several ways to classify scoliosis, including etiology, age of onset, curve location, and curve type.

By etiology, scoliosis can be structural or functional. Structural scoliosis is a congenital defect where the curve is not necessarily presented at birth, but the vertebral anomalies at birth influences spinal growth over time. Functional scoliosis (also known as idiopathic scoliosis) accounts for 80% of scoliosis cases and has an unknown cause. Contributing factors to an inadequate control of the spinal growth in functional scoliosis include genetics, leg length discrepancy (LLD), poor posture, and muscle imbalances (Goethem et al., 2007, p. 105-106). Functional scoliosis can be subdivided by age of onset into infantile (0-3 years), juvenile (4-10 years), adolescent (11-17 years) and adult (≥ 18 years).

In both types of scoliosis, the location of the curve is defined by its apex, the most lateral vertebra of the curve. Scoliosis is classified as cervical if the apex is between C2-C6, cervicothoracic if C7-T1, thoracic if T2-T11, thoracolumbar if T12-L1, lumbar if L2-L4, and lumbosacral for L5 and below (Goethem et al., 2007, p. 108). Scoliotic curve types are separated into primary and secondary curves. Primary curves are those who are first to develop and secondary curves develop to provide balance between the head, trunk and pelvis. Functional scoliosis is often accompanied by secondary curves.

In cases of adult scoliosis, there are 1) primary degenerative scoliosis, 2) progressive idiopathic scoliosis that progresses from adolescence into adult life and develops secondary
degeneration and imbalance, and 3) secondary degenerative curves that arise from a) LLD or b) asymmetrical anomalies from metabolic bone diseases (Aebi, 2005, p. 925). Among the four types, type 3a is clinically the most prominent. Clinical presentation of this type is often back pain, radicular leg pain and claudication symptoms. Back pain is often at the apex or on the concave side of the curve, and this pain is likely due to overloaded and imbalanced mechanical stability. The pain is often diffuse across the lower back near the iliac crest and sacrum.

Typically, the pain is constant and non-specific but is exacerbated during prolonged standing or sitting and relieved when axial load is removed from spine (Aebi, 2005, p. 931).

Scoliosis is of scientific interest because of its adverse effects as it progresses, and since the severity of the curve tends to increase over time (Rosenberg, 2011, p. 397), there are many associated risk factors that can become life changing. Some examples include cosmetic deformity and potential socio-psychological impacts, chronic low back pain, pulmonary dysfunction, hypertension, right heart failure, and in rare and detrimental cases, cardiopulmonary compromise and death (Weinstein, Dolan, Cheng, Danielsson, & Morcuende, 2008, p. 1529).

**General Swedish massage and Myofascial Trigger Point Release**

Massage can eliminate the pain source by bringing blood flow to the ischemic tissue area through mechanical pressure on lymphatics and veins. It is beneficial for different systems of our body including cardiovascular, lymphatic, musculoskeletal, respiratory, immune, and nervous system (Rattray & Ludwig, 2000, p. 10-15). Techniques of massage include Swedish and non-Swedish massage. General Swedish massage (GSM) is composed of the classical manipulation techniques used by a Registered Massage Therapist (RMT). Its main four components include direction of movement, pressure, rhythm and rate of movement, and duration. Variations in these
components will allow the RMT to achieve either a sedating or stimulating effect. Examples of
GSM techniques are stroking, effleurage, petrissage (muscle squeezing, muscle stripping,
wringing, picking up, skin rolling, kneading), vibrations and tapotement (Rattray & Ludwig,
2000, p. 19-28). Variations of Swedish techniques can help reduce hypertonicity musculature,
especially on the convex side of a Scoliotic curve. The RMT considers what treatment goals
would be most beneficial for the client based on their clinical presentation, and creates an ideal
treatment plan involving GSM techniques.

On a similar note, Myofascial Trigger Point Release (MFTP) is a technique that targets
trigger points in the body, which have been reported as a source of muscular pain for those even
at infancy and childhood. By definition, a trigger point is “a hyperirritable spot, usually within a
taut band of skeletal muscle or its fascia”, tender on palpation, has a referral pain pattern and
causes the affected muscle to be shortened (Rattray & Ludwig, 2000, p. 203). Trigger points are
strongly associated to common conditions such as Myofascial Pain Syndrome (MPS) (Moraska,
Hickner, Kohrt, & Brewer, 2013, p. 196), Tension Headaches (Moraska, Schmiege, Mann,
Butryn, & Krutsch, 2017, p. 639), Carpal Tunnel Syndrome, Thoracic Outlet Syndrome (TOS)
(Hamm, 2005), and many other conditions involving structures being internally compressed by
hypertonic muscles.

MFTP can be performed by slow skin rolling, repetitive muscle stripping,
alternating/prolonged ischemic compression, percussion and stretch, and intermittent cold
distraction and stretch. Any of the method used is followed by a passive stretch, active range of
motion (AROM), and heat (Rattray & Ludwig, 2000, p. 213). Although the method of
application is variable, the ultimate effects of MFTP is the same. MFTP can reduce trigger points
and increase local nutritive blood flow, which improves microvascular exchange of nutrients and
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Oxygen delivery to skeletal muscles, and thereby promote tissue health (Moraska et al., 2013, p. 199). In addition, MFTP has been found to increase Pain Pressure Threshold (PPT), which suggests a pain-reducing effect physiologically (Moraska et al., 2013, p. 199). MFTP can increase PPT in a single massage treatment, and has great capacity to increase even after multiple treatments (Moraska et al., 2017, p. 639). With variation in types of trigger points and referral patterns of each muscle, MFTP can help reduce pain in the muscle directly worked on as well as indirectly to a muscle that has referred pain (Rattray & Ludwig, 2000, p. 205, 209).

In scoliosis, muscles on the convex side of the curve are typically elongated and weak, while on the concave side they are shortened (Magee, 2005, p. 1029). The spinal deformity and muscle imbalances in scoliosis have the ability to create trigger points and fibrotic contracture. For example, TOS is a linked pathology to scoliosis, and the scalene muscles serve as the most common sites for TOS entrapment (Hamm, 2005, p. 13). Trigger points are likely to accompany the shortened scalene musculature on the concave side of the curve. With that said, myofascial trigger point release along with general Swedish massage are effective in reducing pain symptoms of scoliosis.

Methods

Patient Profile

The patient is a 25 year old female that is currently a full-time nursing student and part-time pharmacy assistant. She describes her physical level as sedentary as she spends most of her days either sitting or standing for prolonged hours. On a weekly basis, she spends 5 days sitting for roughly 6 hours/day, and 2-3 days standing for 8 hours/day. Her physical activity includes going to the gym 1-2 times per week for 45-60 minutes, and commuting daily via transit. Her
sleep pattern fluctuates from 5-6 hours/night on weekdays and 10 hours/night on weekends, but she describes the quality as poor for both cases. The current main stress factor in her life is school.

The patient complains of dull pain primarily in her left quadratus lumborum (QL) and left anterior hip near anterior superior iliac spine (ASIS), and shooting pain that radiates down the left posterior thigh to knee. She also gets numbness and tingling down her right anterior arm to all digits. These symptoms began four years ago after she started working at the pharmacy. Based on the Visual Analog Scale (VAS) (See Appendix A for more information on Visual Analog Scale), the patient experiences 8/10 for the left QL and ASIS consistently. She describes the leg pain as 10/10 at its worst and 0/10 at its best, and that standing for prolonged hours aggravates it while “swinging” her leg in a flexion/extension motion alleviates it. The numbness down her arm is spontaneous and she does not consider it as pain. She has never had any injuries to the areas of complaint, nor has she received treatment by any healthcare practitioners. She does not take any medications related to the pain, but due to her medical history of having thyroid cancer, she takes Synthroid on a daily basis.

Physical Examination

Baseline measurements were obtained by an initial scam exam (ISE) (See Appendix B for a sample of Initial Scam Exam), which reveals asymmetry and postural faults from the feet upwards to the head. Four views were observed, including anterior, posterior and two lateral views. Consistent landmarks were used to make the observation more accurate.

The patient does not wear orthotics. Angles of foot arch and knee were within normal limits. It was not apparent from the ISE that the patient has leg length discrepancy, but when the
Leg Length Measurement Test was performed at a later time, it appears that the patient has a longer right leg (92 cm) than left (89 cm). Her left posterior superior iliac spine (PSIS) appears lower than her right. As a result, the Gillet’s Sacral Fixation Test was performed. Other special tests including Straight Leg Raise, Quadrant Test, Prone Knee Bend, Valsava, Gaenslen’s and Thomas Test were performed during different treatments to rule out differential diagnoses.

The patient presents with a type 3 (secondary degenerative curve due to leg length discrepancy) right thoracic and left lumbar curve. According to Greiner (2002, p. 1820), the Cobb Method can be used to measure the angle of a scoliotic curve. The method suggests to landmark the most tilted vertebrae above and below the apex vertebrae of the curve, create perpendicular lines with the landmarks, and measure the angle of which the two lines intersect.

Her apex vertebrae was thoracic vertebrae 4 (T4) and lumbar vertebrae 2 (L2). The most tilted vertebrae from T4 was C7 above and T7 below, and for L2 was T12 above and L4 below. With this method, the patient’s right thoracic curve and left lumbar curve were measured to be 50 degrees and 45 degrees, respectively. Both spinal deformity curves exceed 10 degrees of Cobb Angle in the coronal plane, which meets the definition of Adult Scoliosis for a skeletally mature patient (Aebi, 2005, p. 925). To assess whether the patient has structural or functional scoliosis, the Skyline Test was performed.

The patient has slight hyperlordosis in her lumbar spine and cervical spine, but her thoracic kyphotic curve is within normal limits. Her left shoulder appeared to be slightly higher. Due to the patient’s complaint of having numbness and tingling down her right arm, Adson’s Test and Costoclavicular Syndrome (Military Brace) Test was performed bilaterally.

In terms of palpation and functional tests, her left QL was more hypertonic than her right, and it was tender on palpation. She had a decreased range of motion in lumbar spine when
performing toe reach, and there was slight pain with extension. Squat and rise was within normal limits and elicited no pain.

**Tools of Assessment**

As previously mentioned, an introductory questionnaire, ISE, and functional testing were used for assessment. In addition, a spinal joint exam was also used pre- and post- every treatment (See Appendix C for a sample of Spinal Joint Exam), and post-treatment reassessment was done particularly for ranges that elicited pain or were hypomobile. A clinical assessment chart was used to measure range of motion degrees (Prohealthsys, 2017). Special tests were used to confirm or eliminate potential conditions (See Appendix D for instructions on each special test performed in this case study).

Spinous processes were marked and a grid line was used to visualize the spine curvature. A photo was taken and grid lines, perpendicular lines and a goniometer were used to illustrate the patient’s scoliotic curvature angles (See Appendix E for the photo).

VAS was used to assess pain intensity for assessment. It is a unidimensional measurement of pain intensity in which greater pain intensity is indicated by high scores. VAS is easy to use and has a good retest liability (Hawker, Mian, Kendzerska, & French, 2011, p. S240-S252).

The patient was also asked to keep a journal of pain, in which she filled out on a weekly basis to elaborate on the pain she experienced. Pain Quality Assessment Scale (PQAS) was administered to the patient, which helps measure different aspects of the pain throughout the week between treatments (See Appendix F for a sample of Pain Quality Assessment Scale).
Summary of Treatments

This case study included a total of 6 treatments, all of which followed the same protocol. Each treatment had a 60 minute duration with the patient in prone and supine for 30 minutes each. The first four treatments were performed on a twice a week basis for two weeks, and the last two were performed once a week for two weeks. Because the patient’s idiopathic scoliosis stems from leg length discrepancy, massage therapy can only address the associated symptoms and muscle imbalances to prevent further exacerbation of the scoliotic curve. Thus, the purpose of the treatments were to decrease symptoms related to scoliosis that the patient presents, which includes low back pain (left QL), left anterior hip pain, pain down the left thigh to knee, and numbness down her right arm. The treatments also targeted shortened musculature related to the scoliotic curve. A pain scale of 1-5 was used to maintain communication of what the patient’s pain tolerance was (See Appendix G for pain scale used in treatment).

For each treatment, two modalities including GSM and MFTP were used, and the protocol was as follows. The patient began in a prone position and introductory GSM techniques including effleurage and palmar stroke were applied to the whole back and upper trapezius (UT) bilaterally to promote hyperemia and prepare the tissue for deeper techniques (Rattray & Ludwig, 2000, p. 20-23). The same techniques were later performed in supine to pectoralis major bilaterally to prepare for deeper work to pectoralis minor. A light to moderate pressure was used in a slow and rhythmic manner for a sedative effect (Rattray, 2000, p.20). Then, moderate pressure fingertip kneading was applied to the left thoracic erector spinae group (T/S ESG), and thumb kneading was applied to the left rhomboids major and minor and right QL. Deep muscle stripping along fibre direction was then done on the left to T/S ESG and rhomboids and on the right to QL. The same was applied later in supine to the right UT, sternocleidomastoid (SCM),
scalene muscles, levator scapulae and pectoralis minor to decrease hypertonicity of these muscles (Rattray & Ludwig, 2000, p. 24-25).

Trigger point release by prolonged ischemic compression was applied following muscle stripping to left rhomboids, right QL, UT, SCM, scalene muscles, pectoralis minor, and levator scapulae to decrease trigger points in these muscles (if present). These muscles were specifically targeted according to symptoms the patient presented. For instance, the left rhomboids and right QL are on concave side of the scoliosis, which are commonly shortened (Magee, 2014, p. 1029). Although the patient complains of pain in left QL, treating left QL would mean treating an already elongated muscle on the convex side of the curve (Magee, 2014, p. 1029), which could potentially exacerbate the left lumbar curve. Likewise, treating right rhomboids can worsen the right thoracic curve, despite the patient experiencing numbness down the right arm. However, since TOS symptoms include numbness, tingling or shooting pain down the affected arm (Hamm, 2005, p.14), and scalenes are the most common entrapment site, treating primarily the scalene muscles and pectoralis minor and secondarily UT, SCM, levator scapulae on the right can reduce the symptoms.

Trigger point release was held until patient felt a decrease in pain or until the therapist felt a release of the palpable nodule. Following the MFTP protocol, a 30 second passive stretch, active range of motion (AROM) (5x) and heat was applied for each muscle that had a trigger point released (Rattray and Ludwig, 2000, p. 213). The treatment ended with GSM techniques that encourage flushing and removal of irritating metabolites of the muscle, increase local circulation and promote tissue health (Rattray & Ludwig, 2000, p. 213). Due to certain guidelines of this case study, remedial exercise was not included.
Results

Table 1 and 2 reflect the patient’s range of motion of the lumbar spine.

Table 1 includes measurements of all ranges during the initial assessment and each of the six treatments pre-treatment.

Table 2 shows degrees of only the range that elicited pain or were hypomobile according to Magee (2005, p. 530), which includes flexion and extension. Both ranges were hypomobile in treatment 1 and 2, so measurements were taken pre- and post-treatment. By the 3rd treatment, flexion was within normal limits (40 to 60 degrees), so only extension was reassessed post-treatment.

<table>
<thead>
<tr>
<th></th>
<th>Initial Assessment</th>
<th>Tx #1</th>
<th>Tx #2</th>
<th>Tx #3</th>
<th>Tx #4</th>
<th>Tx #5</th>
<th>Tx #6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion</td>
<td>30</td>
<td>27</td>
<td>25</td>
<td>40</td>
<td>41</td>
<td>45</td>
<td>42</td>
</tr>
<tr>
<td>Extension</td>
<td>13</td>
<td>15</td>
<td>12</td>
<td>16</td>
<td>12</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>L Lateral Rotation</td>
<td>18</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>R Lateral Rotation</td>
<td>15</td>
<td>15</td>
<td>18</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>L Rotation</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>R Rotation</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>18</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 1. Lumbar spine range of motion for all ranges pre-treatment, measured in degrees.
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Table 2. Lumbar spine flexion and extension range of motion pre- and post-treatment, measured in degrees.

Table 3. Special tests results and indications.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Special Test</th>
<th>Result</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial assessment</td>
<td>Skyline</td>
<td>+</td>
<td>Functional scoliosis is present.</td>
</tr>
<tr>
<td>Leg Length Discrepancy</td>
<td>+</td>
<td>Total: Right – 92 cm</td>
<td>Left – 89 cm</td>
</tr>
<tr>
<td></td>
<td>Ischial tuberosity to greater trochanter:</td>
<td>Right/Left – 16.5 cm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Greater trochanter to lateral joint line:</td>
<td>Right – 41 cm</td>
<td>Left – 40 cm</td>
</tr>
<tr>
<td></td>
<td>Medial joint line to medial malleolus:</td>
<td>Right – 39 cm</td>
<td>Left – 37 cm</td>
</tr>
<tr>
<td>Adson’s</td>
<td>(R) +</td>
<td>(L) -</td>
<td>TOS is present on right side.</td>
</tr>
<tr>
<td>Costoclavicular Syndrome Test</td>
<td>(R) +</td>
<td>(L) -</td>
<td>TOS is present on right side.</td>
</tr>
<tr>
<td>Gillet’s</td>
<td>(R) +</td>
<td>(L) -</td>
<td>Sacroiliac joint is hypomobile on the right side.</td>
</tr>
<tr>
<td>3 Straight Leg Raise (SLR)</td>
<td>(BL) -</td>
<td>No indication of nerve damage or pressure on neurological tissue, whether centrally or peripherally.</td>
<td></td>
</tr>
<tr>
<td>Quadrant</td>
<td>(BL) -</td>
<td>Inconclusive.</td>
<td></td>
</tr>
<tr>
<td>5 Prone Knee Bend</td>
<td>(BL) -</td>
<td>No indication of L2 or L3 nerve root lesion.</td>
<td></td>
</tr>
<tr>
<td>Quadrant</td>
<td>(BL) +</td>
<td>Inconclusive.</td>
<td></td>
</tr>
<tr>
<td>6 Valsava</td>
<td>-</td>
<td>No indication of increased intrathecal pressure causing sciatic nerve distribution.</td>
<td></td>
</tr>
<tr>
<td>Gaenslen’s</td>
<td>(BL) -</td>
<td>No indication of ipsilateral sacroiliac joint lesion, hip pathology or L4 nerve root lesion.</td>
<td></td>
</tr>
<tr>
<td>Thomas</td>
<td>(BL) +</td>
<td>Hip flexion contracture is present bilaterally.</td>
<td></td>
</tr>
</tbody>
</table>
Table 4 discloses the amount of pain as measured by VAS, taken during initial assessment and each pre-treatment.

<table>
<thead>
<tr>
<th></th>
<th>Baseline (Post-Assessment)</th>
<th>Post Tx #1</th>
<th>Post Tx #2</th>
<th>Post Tx #3</th>
<th>Post Tx #4</th>
<th>Post Tx #5</th>
<th>Post Tx #6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intense</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sharp</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dull</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Tender</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Shooting</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tender</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Numb</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Electrical</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tingling</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Radiating</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Aching</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Unpleasant</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Time</td>
<td>Variable</td>
<td>Variable</td>
<td>Variable</td>
<td>Variable</td>
<td>Variable</td>
<td>Variable</td>
<td>Variable</td>
</tr>
</tbody>
</table>

Table 5 shows the PQAS journal of pain that the patient filled out post assessment and each treatment. Questions that were filled as “0” (no pain) throughout the entire course of the treatments have been excluded in this table. Keywords of those questions include: hot (#3), cold (#5), sensitive (#6), itchy (#8), cramping (#13), throbbing (#15), heavy (#17), and intense deep/surface pain (#19).
Discussion/Conclusion

As hypothesized, GSM and MFTP was able to reduce pain symptoms related to functional scoliosis. First, the spinal joint exam indicates that all ranges of the lumbar spine had an increase in ROM after 6 treatments. Flexion and extension particularly had the largest increase with the patient starting with 27 degrees flexion and 15 degrees extension, and resulting in 42 degrees flexion and 22 degrees extension. Then, the PQAS reveals a decline in level of pain experienced by the patient. The most significant finding was the elimination of pain in left posterior thigh to knee, which was interpreted by the patient as “sharp”, “shooting”, and “electrical” in the PQAS. On the same note, “intense”, “dull”, “tender” and “aching” was interpreted as low back pain, and “numb”, “tingling” and “radiating” referred to numbness down her right arm. Lastly, “unpleasant” represented as her body’s overall feeling.

By the end of the first treatment, the patient reported no pain in the left antero-lateral hip near the ASIS and down the posterior thigh to knee. According to Simons, trigger points in QL project a referral pain pattern to the sacroiliac joint, lateral hip regions, and particularly to posterior gluteus minimus, which can generate a sciatic-like pain pattern (1988, p. 23). The patient has a hypertonic and painful left QL, which may explain the shooting pain down her left posterior thigh to knee resembling a sciatic-like pain pattern (Rattray & Ludwig, 2000, p. 621). By treating the right QL with GSM and MFTP, stress on the left QL may have been relieved and pain reduction was successful.

Simons also states that QL is one of the most common source of myogenic back pain (1988, p.23). Each treatment between treatments #1 to #4 reveals a steady decline in low back pain as indicated by the PQAS that the patient filled out. The only variation was the slight increase after treatment #3, but this may be explained by confounding factors such as having her
menstrual cycle begin the same week. The last 3 treatments (#4 to #6) displayed a constant number on PQAS, indicating no change in the amount of low back pain experienced those weeks. In summary of all treatments, the patient’s low back pain went from 6/10 to 2/10.

Similarly for numbness down her right arm, trigger points in scalene muscles can project a referral pattern down the affected arm (Hamm, 2006, p.13). In treating the trigger points primarily in scalene muscles and pectoralis minor and secondarily in UT, levator scapulae and SCM, a 50% reduction of symptoms was accomplished after 2nd treatment and was completely diminished after 3rd treatment.

Overall, the patient’s feeling of unpleasantness went from 8/10 in the initial assessment to 0/10 during the exit interview. Based on these results, GSM and MFTP were effective in reducing the pain symptoms of functional scoliosis that the patient was presented with.

Although there was significant improvement in low back pain from the treatments, it unfortunately was not eliminated due to the patient’s LLD. The patient claims that her low back pain is aggravated by prolonged standing at work. According to a study (2015), LLD is associated with low back pain for those who must stand while working, which can be due to asymmetrical loading on the lumbar spine and pelvis (Rannisto, Okuloff, Uitti, Paananen, Rannisto, Malmivaara, & Karppinen, 2015, p. 1, 6). LLD is an asymmetry is bone length, which can only be treated by either internal or external shoe lift, or by surgical lengthening of shorter limb (Raczkowski, Daniszewska, & Zolynski, 2010, p. 395). In fact, LLD equalization can eliminate the functional scoliosis completely (Raczkowski et al., 2010, p. 397), which means that the low back pain and radicular leg pain can be eliminated only by surgical means (Aebi, 2005, p. 931). Nonetheless, the treatments involving GSM and MFTP were effective in reducing pain symptoms as well as increase range of motion of the lumbar spine.
Effects of General Swedish Massage and Myofascial Trigger Point Release on Reducing Pain Symptoms of Functional Scoliosis: a Case Study

There are several limitations to this study. First, some confounding factors that may have affected treatment outcome include: 1) whether trigger points were actually present in the muscle belly during different treatments, 2) what change in activities of daily living (ADL) did the patient have during the course of the 6 treatment period, such as taking up yoga during the week of 2nd and 3rd treatments, or having her menstrual cycle the week of the 4th treatment, 3) fluctuations in mood or diet, and 4) changes in work schedule or school workload. Second, the treatments were limited to using only GSM and MFTP. Incorporating multiple modalities or using a modality more suitable than MFTP could have greatly affected the treatment outcome. Third, the therapist’s inexperience could have skewed the assessment and treatment approach. For example, TOS was assumed to be related to scoliosis and confirmed by only two tests. The treatment approach that targeted scalene and pectoralis minor did not consider the precaution that MFTP is a deep compressive technique which could further compress the nerves. Other tests such as cervical spine ROM, Carpal Compression Test, and Upper Limb Tension Tests were not used to better understand the etiology of numbness down the arm. Lastly, should a similar case study be performed, there will be discrepancy between therapists as well as individuals and their symptoms. With that said, it is difficult to replicate this study and get a conventional approach to treating symptoms of functional scoliosis.

In conclusion, massage therapy involving General Swedish massage and Myofascial Trigger Point Release technique can help reduce pain symptoms. However, further studies involving a larger sample size and more uniform assessment methods and treatment protocol would help establish massage therapy as effective in treating symptoms of functional scoliosis.
Appendix A. Visual Analog Scale

<table>
<thead>
<tr>
<th>No Pain</th>
<th>Moderate Pain</th>
<th>Worst Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

Appendix B. Initial Scan Exam

[Image of Initial Scan Exam (ISE)]

[Image of Palpation summary (4 T's)]

[Image of Functional tests table]

[Image of Regional Functional tests]
Appendix C. Spinal Joint Exam

Appendix D. Special Tests (Magee, 2014).

Skyline Test.  
Leg Length Test.
Effects of General Swedish Massage and Myofascial Trigger Point Release on Reducing Pain Symptoms of Functional Scoliosis: a Case Study

Adson’s Test.

Costoclavicular Syndrome Test.

Gillet’s (Sacral Fixation) Test.

Straight Leg Raise Test.

Quadrant Test.

Prone Knee Bend Test.
Effects of General Swedish Massage and Myofascial Trigger Point Release on Reducing Pain Symptoms of Functional Scoliosis: a Case Study

Valsava: “This test is used to determine the effect of increased pressure on the spinal cord. The examiner asks the patient to take a deep breath and hold it while bearing down, as if moving the bowels. A positive test is indicated by increased pain, which may be caused by increased intrathecal pressure. This increased pressure within the spinal cord usually results from a space-occupying lesion, such as a herniated disc, a tumor, stenosis, or osteophytes. Test results are very subjective. The test should be performed with care and caution because the patient may become dizzy and pass out during the test or shortly afterward if the procedure blocks the blood supply to the brain.”

Gaenslen’s Test.

Thomas Test.

Appendix E. Scoliotic Curvature
Appendix F. Pain Quality Assessment Scale

**PAIN QUALITY ASSESSMENT SCALE® (PQAS®)**

Instructions: There are different aspects and types of pain that patients experience and that we are interested in measuring. Pain can feel sharp, hot, cold, dull, and achy. Some pain may feel like they are very superficial (at skin-level), or they may feel like they are from deep inside your body. Pain can be described as unpleasant and also can have different time qualities.

The Pain Quality Assessment Scale helps us measure these and other different aspects of your pain. For one patient, a pain might feel extremely hot and burning, but not at all dull, while another patient may not experience any burning pain, but feel like their pain is very dull and achy. Therefore, we expect you to rate very high on some of the scales below and very low on others.

Please use the 10 rating scales below to rate how much of each different pain quality and type you may or may not have felt OVER THE PAST WEEK, ON AVERAGE.

<table>
<thead>
<tr>
<th>No pain</th>
<th>The most intense pain sensation imaginable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not sharp</th>
<th>The most sharp sensation imaginable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not hot</th>
<th>The most hot sensation imaginable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not dull</th>
<th>The most dull sensation imaginable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not cold</th>
<th>The most cold sensation imaginable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not sensitive</th>
<th>The most sensitive sensation imaginable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not tender</th>
<th>The most tender sensation imaginable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not sticky</th>
<th>The most sticky sensation imaginable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not shooting</th>
<th>The most shooting sensation imaginable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>
Effects of General Swedish Massage and Myofascial Trigger Point Release on Reducing Pain Symptoms of Functional Scoliosis: a Case Study

10. Please use the scale below to tell us how much your pain has felt over the past week. A phrase that can be used to describe much pain is “like it to tears.”

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not much</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
<tr>
<td>4</td>
<td>Very severe</td>
</tr>
</tbody>
</table>

11. Please use the scale below to tell us how much your pain sensations have felt electric over the past week. Words used to describe electrical pain include “shocks” “vibrations” and “tingling.”

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not electrical</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

12. Please use the scale below to tell us how much your pain has felt over the past week. Words used to describe tingly pain include “like pins and needles” and “itchy.”

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not tingly</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

13. Please use the scale below to tell us how much your pain has felt over the past week. Words used to describe cramping pain include “gripping” and “clamping.”

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not cramping</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

14. Please use the scale below to tell us how much your pain has felt over the past week. Words used to describe radiating pain include “shooting” and “squeezing.”

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not radiating</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

15. Please use the scale below to tell us how much your pain has felt over the past week. Words used to describe throbbing pain include “hammering” and “pounding.”

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not throbbing</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

16. Please use the scale below to tell us how much your pain has felt over the past week. Another word used to describe aching pain is “like a toothache.”

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not aching</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

17. Please use the scale below to tell us how much your pain has felt over the past week. Other words used to describe heavy pain are “powerful” and “weighted down.”

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not heavy</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

18. Now that you have told us the different types of pain sensations you have felt, we want you to tell us overall how unpleasant your pain has been to you over the past week. Words used to describe very unpleasant pain include “agonizing” “disgusting” “unbearable” and “unendurable.” Remember, pain can have a low intensity but still feel extremely unpleasant, and some kinds of pain can have a high intensity but be very tolerable. With this scale, please tell us how unpleasant your pain feels.

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not unpleasant</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

19. We want you to give an estimate of the severity of your deep versus surface pain over the past week. We want you to rate each location of pain separately. We realize that it can be difficult to make these estimations, and most likely it will be a best guess, but please give us your best estimate.

**How intense is your deep pain?**

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No deep pain</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

**How intense is your surface pain?**

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No surface pain</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

20. Pain can also have different time qualities. For some people, the pain comes and goes and so they have come onset that are completely without pain; in other words the pain “comes and goes.” This is called intermittent pain. Others are never pain free, but their pain types and pain severity can vary from one moment to the next. This is called variable pain. For these people, the moment can be severe, so that they feel they have moments of very intense pain (“breakthrough” pain), but at other times they can feel lower levels of pain (“background” pain). Still, they are never pain free. Other people have pain that really does not change much from one moment to another. This is called stable pain. Which of these best describes the time pattern of your pain (please select only one):

- I have intermittent pain (I feel pain sometimes but I am pain-free at other times).
- I have variable pain (breakthrough pain all the time, but also moments of no pain, or even severe “breakthrough” pain or even “minor” types of pain).
- I have stable pain (constant pain that does not change very much from one moment to another, and no pain-free periods).
Appendix G. Pain Scale

1 – Light touch

2 – Firm pressure

3 – Therapeutic pressure (painful but feels good)

4 – Pain that is difficult to breathe through

5 – Pain that indicates to stop immediately
## Appendix H. Treatment Records

![Patient Intake Form](image)

Please complete this form in order to assist us in becoming familiar with your health history. All information is considered strictly confidential under the guidelines of the *Personal Information Protection and Electronic Documents Act (PIPED)*.

- **NAME:**
- **Date of Birth:**
- **Male ✔️ Female ❌**
- **Address:**
- **Phone #: home: work/cell:**
- **Email:**

### General
- **Allergies:**
- **Depression/Anxiety:**
- **Dizziness:**
- **Dizziness:**
- **Fatigue:**
- **Headaches:**
- **Loss of sleep:**
- **Weight loss/gain:**
- **Other:**

### Skin
- **Bruise easily**
- **Dry / Oily:**
- **Eczema:**
- **Hives / Rash:**
- **Psoriasis:**
- **Other:**

### Cardiovascular
- **Anemia:**
- **Arteriosclerosis:**
- **Cold feet:**
- **Edema:**
- **Heart Disease:**
- **High/Low blood pressure:**
- **Rheumatic fever:**
- **Stroke:**
- **Swelling of ankles:**
- **Varicose veins:**
- **Other:**

### Women
- **Menopause:**
- **Pregnant:**
- **Yes ✔️ No ❌**
- **If yes # months:**
- **Breast conditions:**

### Respiratory
- **Asthma:**
- **Bronchitis:**
- **Chest Pain:**
- **Chronic Cough:**
- **Difficulty breathing:**
- **Emphysema:**
- **Pneumonia:**
- **Other:**

### Gastrointestinal
- **Abdominal Pain:**
- **Appendicitis:**
- **Diabetes:**
- **Constipation:**
- **Diarhea:**
- **Heart Burn:**
- **IBS/Chrohn’s/Colic:**

### Nervous System
- **Epilepsy:**
- **Multiple Sclerosis:**
- **Numbness / Tingling:**
- **Other:**

### Systemic Disorders
- **Cancer (Type):**
- **Diabetes (Type):**
- **Fibromyalgia:**
- **HIV / AIDS:**
- **Osteoporosis:**
- **Post Polio Syndrome:**
- **Thyroid disease:**
- **Other:**

---

Please turn over.
Effects of General Swedish Massage and Myofascial Trigger Point Release on Reducing Pain Symptoms of Functional Scoliosis: a Case Study

PATIENT INTAKE FORM

West Coast College of Massage Therapy

Give a brief detailed description of the problem you are currently experiencing: back + neck pain > 6 months - Auto Accident

- How long have you had this condition? > 6 months

- Is it getting worse / better?

- Does it bother you (check appropriate box): work, sleep, other:

- What seemed to be the initial cause:

- Are you currently satisfied with your:
  - Physical health & fitness? Yes / No
  - Mental and emotional happiness? Yes / No
  - Diet? Yes / No
  - Ability to relax? Yes / No

- Do you exercise regularly?

- How is most of your day spent?: Standing / Sitting / Other:

- When was your last physical exam? May 2016

- Please describe your stress level:

Past Health History:

- Have you ever:
  - Been hospitalized (surgery etc.): Yes / No
  - Suffered from depression/anxiety: Yes / No
  - Had any broken bones: Yes / No
  - Had any sprains or strains?: Yes / No
  - Used orthotics: Yes / No
  - Had pins, plates, screws, rods, prostheses, breast implants: Yes / No

- If yes explain briefly:
  - Thyroid removal:
  - Orthopedic:

Please list any medications you are currently taking and why:

- Synthroid - Thyroid Supplement

Alcohol, tobacco, and recreational drug use: N/A

Is there anything else your student therapist should know?

Consent and Release:

I acknowledge that the above information is accurate and true to the best of my knowledge. I fully understand that this is a teaching massage clinic and accordingly, a clinic instructor may be present during any aspect of my treatment. Our clinic makes every effort to ensure that your experience here is safe, effective, and enjoyable.

The West Coast College of Massage Therapy Inc., its employees, servants and agents (the “college”), do not accept liability for any claim arising from the method or manner of treatment given, or any complaint related to supposed conditions arising from therapy. In good and valuable consideration, the undersigned does hereby release and forever discharge the College, its successors and assigns, from any other legal obligations and compensation of whatsoever kind and howsoever arising from or out of any treatment which will be provided to the undersigned.

Please sign below to show that you fully understand and agree to the above disclaimer and stated conditions of receiving treatment at the West Coast College of Massage Therapy Clinic.

Signature: [redacted] Date: Jan 30, 2011

Patient information is considered strictly confidential under the guidelines of the Personal Information Protection and Electronic Documents Act (PIPEDA)

Instructor signature: [redacted]
Effects of General Swedish Massage and Myofascial Trigger Point Release on Reducing Pain Symptoms of Functional Scoliosis: a Case Study

Patient History Term 3 & 4

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>Date: July 4, 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupation:</td>
<td>Nursing Student</td>
</tr>
<tr>
<td>Age:</td>
<td>25</td>
</tr>
<tr>
<td>Intern:</td>
<td>Wenda Cho</td>
</tr>
<tr>
<td>Class:</td>
<td>170</td>
</tr>
<tr>
<td>Term:</td>
<td>4</td>
</tr>
</tbody>
</table>

CUES FOR STUDENTS:
Review intake questionnaire ("C" is "red flags")

CHIEF CONCERN:
1. Why is he/she seeking Massage Therapy?
2. Location/Radiation

3. Onset:

4. Chronology / Timing / Prior Episodes:

5. Quality (Sharp, dull, shooting, tight, aching)

6. Severity (Scale of 0 – 10 with "0" no pain and "10" the highest amount of pain):

7. Modifying factors:

8. Associated symptoms (NTW)

9. Treatment history:

10. Prior Injuries:

11. Medications:

CONDITIONAL FACTORS:
1. Hereditary/Family health conditions.
2. Exercise/Interests/Activities
3. Sleep patterns:

4. Stress Factors:

PATIENT TREATMENT GOALS:

ANYTHING ELSE HE/SHE WOULD LIKE TO ADD:

Clinic Instructor:

Patient information is considered strictly confidential under the guidelines of the Personal Information Protection and Electronic Documents Act (PIPED)
Effects of General Swedish Massage and Myofascial Trigger Point Release on Reducing Pain Symptoms of Functional Scoliosis: a Case Study

**Initial Scan Exam (ISE)**

**Palpation summary (4 T’s)**
- **1°** Temp - warm WNL
- Tone - HT UL Ø > Ø
- Text - soft
- Tend - Tender Ø UL

**Functional tests**

<table>
<thead>
<tr>
<th>Region</th>
<th>Functional Test</th>
<th>Findings (pain/ROM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L/S</td>
<td>Tie reach</td>
<td>L ROM X Ø flex, X Ø ext</td>
</tr>
<tr>
<td>AF</td>
<td>Squat + Rise</td>
<td>WNL ROM BL X Ø</td>
</tr>
</tbody>
</table>

**Regional Functional Tests**
- Shoulder (Apexy's superiorinferior)
- Elbow (flexion/extension)
- Wrist/hand (hand shank/grip)
- Hip (squat & rise)
- Knee (squat & rise)
- Ankle (squat & rise, heel/toe walk)
- C-spine (shoulder check, up/down)
- T-spine (flexion/extension)
- L-spine (squat & rise, touch toes)
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Spinal Joint Exam

<table>
<thead>
<tr>
<th>Legend</th>
<th>Contra-Indications or Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Active ROM</td>
</tr>
<tr>
<td>1</td>
<td>Passive ROM</td>
</tr>
<tr>
<td>15</td>
<td>Hypermobility</td>
</tr>
<tr>
<td>(</td>
<td>Pain in ROM</td>
</tr>
</tbody>
</table>

Additional Notes:
- [LDD]: L1-L5: 34 cm
- [L4-L5]: 34 cm
- [L5-S1]: 34 cm

1. Spinal Joint Examined: L5

   - L Rotation
   - R Rotation
   - L Lat. Flexion
   - R Lat. Flexion

   Pre-treatment:
   - ~15°
   - ~30° Flexion
   - ~15°
   - ~15° Extension

   Post-treatment:
   - ~15°
   - ~30° Flexion
   - ~15°
   - ~15° Extension

2. Abnormal End-feels
   - Movement
   - Quality

3. Restriction Pattern
   - Capsular
   - Non-capsular

4. Resisted ROM Testing
   - Direction: Flexion
   - Grade: 5
   - Pain (y/n): N

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

5. Joint Play (C-L) Assessment
   - L1-L4, L5-S1
   - Flex: Hypo.

6. Special Tests
   - TOS - Adyn
   - Leg Length Measurement
   - Skylene

7. Differential Diagnosis

8. Spinal Joint Examined: L3

   - L Rotation
   - R Rotation
   - L Lat. Flexion
   - R Lat. Flexion

   Post-treatment:
   - ~15°
   - ~30° Flexion
   - ~15°
   - ~15° Extension

---

Clinic instructor: [Signature]
Date: July 13, 2017

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<td>15</td>
<td>Hypermobility</td>
</tr>
<tr>
<td>3</td>
<td>Pain in ROM</td>
</tr>
</tbody>
</table>

**Additional Notes:**
- Initial cycle - liquid tx in L8.

#### 1. Spinal Joint Exam

- **Pre-treatment:**
  - L Rotation: 41°
  - Flexion: 16°
  - R Lat. Flexion: 25°
  - L Lat. Flexion: 25°
  - Extension: 12°

- **Post-treatment:**
  - L Rotation: 41°
  - Flexion: 16°
  - R Lat. Flexion: 25°
  - L Lat. Flexion: 25°
  - Extension: 12°

#### 2. Abnormal End-feels

- **Movement:**
- **Quality:**

#### 3. Restriction Pattern

- **Capsular:**
- **Non-capsular:**

#### 4. Resisted ROM Testing

<table>
<thead>
<tr>
<th>Direction</th>
<th>Grade</th>
<th>Pain (y/n)</th>
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<tbody>
<tr>
<td>Flexion</td>
<td>5</td>
<td>Y</td>
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<tr>
<td>Extension</td>
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<tr>
<td>Right Rotation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left Rotation</td>
<td></td>
<td></td>
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<tr>
<td>Right Lateral Flexion</td>
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<td></td>
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<tr>
<td>Left Lateral Flexion</td>
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<td></td>
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</tbody>
</table>

\[\text{Intern:} \quad \text{Wendy Chou}\]

#### 5. Joint Play (C-L) Assessment

- \[\text{Clinic instructor:} \quad \text{Wendy Chou}\]

#### 6. Special Tests

- 4/4

#### 7. Differential Diagnosis

- \[\text{Initial cycle - liquid tx in L8.}\]

#### 8. Spinal Joint Exam

- **Pre-treatment:**
  - L Rotation: 41°
  - Flexion: 16°
  - R Lat. Flexion: 25°
  - L Lat. Flexion: 25°
  - Extension: 12°

- **Post-treatment:**
  - L Rotation: 41°
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### Treatment Plan (Case Study)

<table>
<thead>
<tr>
<th>Goal #</th>
<th>Modality</th>
<th>Area/Tissue</th>
<th>Technique</th>
<th>Duration/Intensity</th>
<th>Result</th>
<th>Re-assess</th>
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</thead>
<tbody>
<tr>
<td>1-5</td>
<td>Swed</td>
<td>Whole Back, Shoulder, Pelv. Bl</td>
<td>Effleurage</td>
<td>Light / full palm contact; 5-6 strokes</td>
<td>Hyperemia</td>
<td>Vital/palp</td>
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<tr>
<td>6</td>
<td>Swed</td>
<td></td>
<td>Palmar</td>
<td>Deeper; &quot;</td>
<td>&quot;</td>
<td>&quot;</td>
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<tr>
<td>7</td>
<td>Swed</td>
<td>Trig Esh; Blq; Thumb/ fingers, Head; M.</td>
<td>Deep; 1 min</td>
<td>HT, 0</td>
<td>palp, pt feedback</td>
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</tr>
<tr>
<td>8</td>
<td>Swed</td>
<td>Muscle Hip</td>
<td>Deeper; &quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
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<tr>
<td>9</td>
<td>mFIP</td>
<td>Trp R</td>
<td>Deep; 1 min</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

### Home Care Plan

<table>
<thead>
<tr>
<th>Goal #</th>
<th>Modality</th>
<th>Area/Tissue</th>
<th>Frequency, Intensity, Duration, Timing</th>
<th>Length of Time</th>
<th>Result</th>
<th>Re-assess</th>
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Instructor: [Signature]
Class: [Signature]
Term: [Signature]
Clinic Instructor: [Signature]
Date: July 18, 2017
Acknowledgment

I would like to thank the Registered Massage Therapists (RMT) who work as clinic instructors at West Coast College of Massage Therapy (WCCMT) that took part in monitoring my case study and provided feedback. I especially want to thank Sorrel Wall for suggesting alternative treatment methods and widen my perspective of possible approaches towards a single condition. I would also like to acknowledge Wilson Mah (RMT, Case Study Advisor) for guiding me throughout the entire case study. Thank you for always providing prompt and constructive feedback, allowing me to structuralize my case study easier. A great thanks to all instructors for the education they have provided, especially Jeff Kraus (RMT, Instructor) who has helped me understand the anatomical physiological changes associated with functional scoliosis, and treatment approaches that can alleviate pain symptoms for scoliosis patients. Finally, I would like to give appreciation towards my case subject for her trust, commitment and enthusiasm in partaking this case study.
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References


Hawker, G., Mian, S., Kendzerska, T., & French, M. (2011). Measures of adult pain: Visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). Arthritis Care & Research, 63(S11), S240-S252. Doi: 10.1002/acr.20543


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Visual analog scale image obtained from Yale University IM: Palliative Care