



Clinical Case Report Competition

West Coast College of Massage Therapy

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Third Place Winner

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Idiopathic scoliosis and swedish massage

ABSTRACT

Objective: To see the effects of Swedish massage in decreasing low back pain in a 47 year old female with idiopathic scoliosis.

Methods: Five, Thirty one minute treatments consisting of Swedish massage, and home care exercises. Pain was graded by using the Oswestry low-back pain questionnaire and a pain scale of 0-10.

Results: The patient recorded a drop of 8% in the disability index moving her from moderate disability to minimal disability. Also a drop of two points was noted with the pain scale in which pain was recorded from a 2/10 to 0/10.

Conclusion: There was a noted decrease in pain associated with this patient, but a much larger sample size is needed to confirm the findings. Massage therapy isn't the cure for scoliosis but a higher standard of living as they age is possible.

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INTRODUCTION TO THE MEDICAL CONDITION

Scoliosis was first termed anywhere from 460-370 BC by the ancient Greek physician Hippocrates who studied patients with a “crooked” spine (Vasiliadis, Grivas, & Kaspiris, 2009). From this observation, we still use the Greek word scoliosis to describe any lateral curvature of the spine. This lateral curvature can be grouped into the two categories of structural or functional scoliosis (Masso & Meeropol, 2002). The spine of a patient who has structural scoliosis is permanently stuck and will always have a lateral curvature to their spine no matter what position they are placed in. The spine of a patient with functional scoliosis is not fixed laterally and actually straightens out with a neutral non-weight bearing spine or with flexion of the spine. Scoliosis can be divided further into three subgroups based on the age of onset. These three subgroups are as follows: infantile (0-3 years), juvenile (4-10 years), and adolescent (11-maturity) (Magee, 2008). It should also be noted that according to Fryette’s first law, neutral side bending produces rotation to the side opposite of the side bent (Greenman, 1989). This means that the vertebral bodies rotate to the convexity of the curve while the spinous processes rotate to the concavity in the thoracic and lumbar spine. The intervertebral disk space is then narrowed on the concave side and adversely widened on the convex side.

You may have noted the fictional character, the hunchback of Notre Dame, as being portrayed as having scoliosis along with a hyperkyphosis (which is the actual hump noted) (Magee, 2008). Hyperkyphosis and hyperlordosis are the excessive posterior and anterior curvatures of the spine respectively that should not be confused with the lateral curvature of scoliosis. Evidently, spinal deformities are quite common as an estimated two to three percent of the population or about six million people in the United States have scoliosis (Gowen, 2011). 85 percent of these cases are classified as idiopathic, meaning that the exact cause of the scoliosis is

unknown and attributed to genetics. This nevertheless makes treatment very costly, invasive, and sometimes ineffective. The pathology most often strikes girls during adolescence, where they most likely have no signs or symptoms and have full function. It is not until puberty that the scoliosis usually starts to appear and once adulthood is reached, the scoliotic curvature increases and patients' functionality begins to diminish. (Magee, 2008) This can most often be seen in the movements of side flexion and rotation of the spine in the direction of convexity. Functionality is reduced even further if the curvature exceeds 60 degrees. At this point, vital capacity is considerably lowered along with compression and malposition of the organs within the ribcage also occurs.

HYPOTHESIS

I hypothesize that a strategically planned, one-hour Swedish massage treatment done once a week for five weeks combined with therapeutic exercises will decrease low back pain in a patient with idiopathic structural scoliosis. This difference will be recorded using the Oswestry Low Back Pain Questionnaire.

COMMON MEDICAL INTERVENTIONS

The type of medical intervention needed varies depending on the age of the patient, the degree of curvature, and physical complications. Although there are many medical interventions we will look at four common treatments in order of increasing invasiveness. These include Occupational therapy, Physiotherapy, bracing and surgery. Many studies have been conducted displaying the benefits and complications of each. A detailed look of each intervention is listed below.

Occupational Therapy

The American Occupational Therapy Association (AOTA) provides a helpful definition of occupational therapy:

The therapeutic use of everyday life activities (occupations) with individuals or groups for the purpose of participation in roles and situations in home, school, workplace, community, and other settings. Occupational therapy services are provided for the purpose of promoting health and wellness and to those who have or are at risk for developing an illness, injury, disease, disorder, condition, impairment, disability, activity limitation, or participation restriction. Occupational therapy addresses the physical, cognitive, psychosocial, sensory, and other aspects of performance in a variety of contexts to support engagement in everyday life activities that affect health, well-being, and quality of life. (Brayman et. al, 2004)

There are several effective interventions related to occupational therapy. Preventative pressure care and provision of pressure relief equipment with a patient who has muscular dystrophy causing scoliosis and is unable to change positions independently is one important way an occupational therapist can intervene (Turner, Foster, & Johnson, 2002). Every effort should also be made to prevent slouching or leaning habitually to one side when seated in order to minimize the spinal curvature and its effects. Correctly sized furniture, chair height, and seat depth is vital in prompting the patient into sitting with an erect posture. Even the posture developed while sleeping can have a dramatic effect on the curvature. Guidance and recommendations to care givers and family on adapting the environment to suit the patient's needs is essential. Often occupational therapists will work alongside patients who have received bracing or surgery to optimize their function. It should be remembered that it is the symptoms

produced by the pathology that is causing the postural abnormality and is rarely just a postural problem.

Physiotherapy

The Schroth method of treating scoliosis is a common exercise program used by physiotherapists today. The basis of this program has to do with the muscular imbalances associated with patients with scoliosis. (Schroth, 2009) The exercise program was developed in the 1920s by Katharina Schroth (1894-1985) and was further developed by her daughter Christa Lehnert-Schroth. By the 1960s, the Schroth Method had become the standard non-surgical treatment for scoliosis in Germany and is used in specific clinics devoted to the Schroth method in England, Spain and North America. One Schroth method study records reversing abnormal scoliotic curvatures by an average of ten percent in four to six-week in-patient programs (Weiss, 1992) and by thirty percent or more in an out-patient program over a period of a year (Otman, Kose, & Yakut, 2005). Additional exercise programs deal with the same intention as the Schroth method to strengthen the weak muscles and elongate the shortened muscles to provide a stable and muscular balanced back.

Bracing

There are three common types of braces used and prescribed by a physician to help prevent further curvature associated with scoliosis (Baltimore, 2008). These include the Boston brace (thoraco-lumbar-sacral-orthosis, “TLSO”), Charleston bending brace and the Milwaukee brace (cervical-thoraco-lumbar-sacral-orthosis). The Boston brace is often referred to as the under arm or low profile brace because it is not as bulky as the Milwaukee brace. Each brace is moulded individually for each patient to provide support for each unique curvature. This brace

extends from below the breast to the beginning of the iliac crest and spans from below the scapula to the sacrum. This type of brace works by applying three-point pressure to the curve to prevent its progression.

The Charleston bending brace is also known as the night time brace because it is worn while sleeping only. This knowledge behind this is that during the eight or so hours of sleep, the patient can over-correct the curvature by sleeping bent in the direction of convexity. This brace is usually only prescribed to patients with a 20-30 degree curvature with the apex of the curvature being around T7. Other options of night braces include the providence, SpineCor or Wilmingtons brace which accommodate patients with different needs.

Finally, the Milwaukee brace was designed in 1945 making it the first brace ever created for patients with scoliosis (Baltimore, 2008). It is a bulky and cosmetically unappealing type of bracing, but is effective for high thoracic curvatures. The brace extends from the neck to the pelvis and consists of a specially contoured plastic pelvic girdle and a neck ring connected by metal bars in the front and the back of the brace. The metal bars help elongate the thorax and the neck ring keeps the head levelled over the pelvis.

Surgery

When all other options have been looked at or symptoms are so severe that immediate action needs to be taken then the last choice would be surgery. A recent study at the University of Buffalo demonstrated the potential benefits of surgical treatment for adults with scoliosis and suggested that the elderly, despite facing the greatest risk of complications, may stand to gain a disproportionately greater improvement in disability and pain with surgery compared with younger patients (Smith et. al, 2011). The Oswestry Disability Index, which is used for assessing the severity of pain experienced by the patient, dropped in all age categories. These include from

age 25-44 (mean 29-22), age 45-64 (mean 36-22), age 65-85 (mean 43-24). This drop is substantial. Unfortunately however, the same study also showed that there were both major and minor complications associated with the surgery. The percentage of patients that experienced complications with their respective age group is as follows: age 25-44 (17%), age 45-64 (42%), age 65-85 (71%). Possible complications include, but are not limited to: chronic pain, growth inhibition in younger patients, pseudoarthrosis, deep or superficial wound infection, pneumonia, deep vein thrombosis, myocardial infarction, digestive problems, radiculopathy, paralysis, foot drop, cerebrospinal fluid leak, hemothorax and death. Clearly, there is a great risk associated with any surgery, especially surgery that involves the central nervous system. As a cosmetic approach it is very controversial and major lifelong complications have developed in some individuals. Great thought needs to be taken before deciding to go through with the surgery. Each individual must ask themselves if the outcome outweighs the possible risks before proceeding.

ETIOLOGY AND PATHOLOGY

75-85 percent of all cases of structural scoliosis are idiopathic, meaning that the etiology is unknown (Magee, 2008). Nevertheless there have been some common correlations that may indeed influence the lateral curvature of the spine. Some of these etiologies include: Wedge vertebra, hemivertebra, failure of segmentation, leg length discrepancy, genetic predisposition, marfans syndrome (genetic disorder of connective tissue carried by gene FBN1), neuromuscular, upper or lower motor neuron lesion, myopathic (generalized muscle weakness with fatigue and a decrease in exercise tolerance), muscular disease, arthrogyrosis (persistent joint contracture) a decrease in melatonin or trauma. Conditions such as neurofibromatosis (tumor growth along various types of nerves, which may affect bones muscles and skin), mesenchymal disorders

(affecting cartilage, bone and adipose) specifically spinal ligament elasticity, infections or inflammatory conditions that result in bone destruction such as rheumatoid arthritis may all contribute to the scoliosis. In depth studies of some of these possible etiologies are listed below.

Genetic Predisposition

Harrington did a study on women with a scoliotic curve that exceeded fifteen degrees and found a 27 percent prevalence of scoliosis among their daughters (Harrington, 1977). Studies collectively characterize idiopathic scoliosis as a single gene disorder, but with a varying degrees of penetrance. This means that a certain percentage of people with the inherited gene may not express it thus making it difficult to isolate genetic predisposition as the only etiological factor.

Decrease in Melatonin

Girardo (2011) quotes Machida and Dubousset in their report, finding that patients with progressive scoliosis had a 35 percent decrease in melatonin levels compared to patients with stable scoliosis. Machida also conducted a study on mice finding that melatonin deficiency in bipedal mice appears to play crucial role for development of scoliosis. Also the restoration of melatonin levels prevents the development of scoliosis. (Machida et. al, 2006). It has yet to be confirmed that melatonin is the primary etiology in the development of Idiopathic Scoliosis, but a strong correlation is nevertheless prevalent.

Spinal Ligament Elastic Fibers

Elastic fiber abnormalities in the spinal ligaments have been reported by Miller. (Miller, 2005). A genetic link associated with the mutation of FBN1 (fibrillin 15), a component of the extracellular matrix, are now linked to Marfan syndrome and similar clinical phenotypes. When studying this gene 52 of the 96 individuals were affected with scoliosis.

Myopathic Etiology

An abnormality of type I (slow-twitch) and type II (fast-twitch) muscle fibers is noted in a particular study of the erector spinae (Spencer & Eccles, 1976). They noted a normal distribution of type I and type II muscle fibers on the convexity but a decrease in the number of type I muscle fibers on the concavity. Another report, however, showed a decrease in the number and size of type II muscle fibers on both the convex and concave side of the curvature (Bylund & Dahlberg, 1987).

Neurological Etiology

A neurological cause of idiopathic scoliosis has been studied extensively, but various studies have contradicted one another so no correlation can be made, unfortunately. Lowe describes the neurological etiology logically:

“Any hypothesis that proposes a neurological defect must account for the impression that many patients with Idiopathic scoliosis have above-average ability in sports. These observations have been largely anecdotal, but a study of girls attending ballet school showed an increased prevalence of idiopathic scoliosis as high as 20%. It's difficult, therefore, to account for a neurological defect that allows the patient to excel in activities demanding high proprioception and coordination." Lowe et. al (2000)

Height to Width Ratio and Period of Accelerated Growth

Another interesting discovery was found with the overall height and the height-to-width ratio of the sixth thoracic vertebrae. Researchers discovered that this difference was notably greater in patients with idiopathic scoliosis predisposing the spine to a column buckling effect (Skogland, 1981). This factor combined with the fact that the period of accelerated growth in puberty starts about one year earlier in girls with scoliosis suggests a predisposition to the column buckling effect (Bjure, Grimby, & Nachemson, 2004).

Disproportional Growth

The thoracic vertebrae in idiopathic scoliosis are known to demonstrate a decreased posterior element growth and increased anterior body wedging, resulting in hypokyphosis or even lordosis, predisposing the spine to scoliosis (Sevastik, et al. 1995).

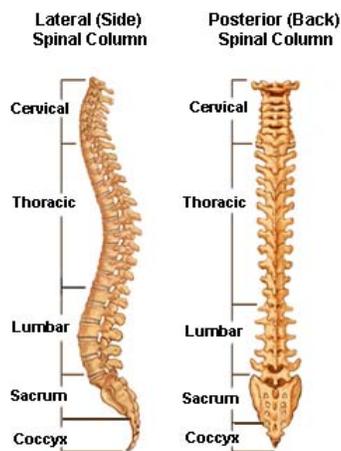
Thoracospinal Vascular Concept

This theory is based on the finding that in convex right thoracic scoliosis, the ribs on the left are consistently longer than those on the right (Katz, 2003). These findings are supported by those of similar studies suggesting the left side of the thorax is more vascular than the right and thus likely to grow more.

ANATOMY

To understand the curvature associated with scoliosis it is important to first understand the spinal anatomy of the human body. The spine can be divided into five regions (Tortora, 2009). These include the cervical, thoracic, lumbar, sacral and coccygeal regions. The cervical spine is the neck consisting of seven vertebra labelled from C1(closest to the head) to C7(closest to the trunk). This is the most mobile segment of the spine. The thoracic region or trunk consists of twelve vertebra labeled from T1-T12. The thoracic vertebrae are connected to the ribs making these joints relatively firm and stable. The lumbar region or low back has five vertebra labeled from L1-L5, making it the last of the “true” vertebrae. The true vertebrae are able to provide movement between its segments. The lumbar spine takes the majority of a person’s body weight and thus has the largest and strongest vertebra. The sacrum or upper tailbone has five vertebra labeled as S1-S5 that fuse during adulthood. Finally, the coccyx or tailbone has four fused vertebrae usually labeled as one bone and is the final segment of the spine. From a posterior direction (looking at the back), the spine appears to be straight. However, when viewed laterally

(or from the side), the spine has four curves alternating from moving inward to outward. These curves are called lordotic (in cervical and lumbar spine) and kyphotic (thoracic, sacral and coccygeal spine) curves. They are normal curves that help to carry and distribute our weight as well as providing flexibility.



(Eidelson, 2011)

A normal spine consists of thirty-three fused and non-fused vertebra which makes up the spinal column. Between the bodies of each non-fused vertebra there are intervertebral discs. These disks act as a shock absorber and cushion the forces that are applied to the spine. The spinal column and intervertebral discs form a protective tunnel for the spinal cord and spinal nerves to pass through. The spinal cord extends from the base of the brain (medulla oblongata) to anywhere from T12-L3. The spine also consists of ligaments, muscles and blood vessels attach to spinal column. The muscles provide powerful movement of the spine while the ligaments provide support for each joint, while the blood vessels provide nourishment to the various structures.

OTHER RESEARCH FINDINGS

Thirteen randomized trials that included 1,596 participants assessing various types of massage therapy for low-back pain were included in one review (Furlan, Imamura, Dryden, &

Irvin, 2008). Eight had a high risk and five had a low risk of bias. Massage was more likely to work when combined with exercises (usually stretching) and education. The amount of benefit was more than that achieved by joint mobilization, relaxation, physical therapy, self-care education or acupuncture. It seems that acupressure or pressure point massage techniques provide more relief than classic (Swedish) massage, although more research is needed to confirm this. The beneficial effects of massage in patients with chronic low-back pain lasted at least one year after the end of the treatment.

There is moderate evidence in a small number of trials that heat wrap therapy provides a small short-term reduction in pain and disability in a population with a mix of acute and sub-acute low-back pain, and that the addition of exercise further reduces pain and improves function (French, Cameron, Walker, Reggars, & Esterman, 2006).

INTRODUCTION TO CASE STUDY AND APPLICATION OF RESEARCH

Based on the research conducted and the techniques available to massage therapists, a specific treatment plan and protocol was created. One element of the treatment plan was based on the foundation of Schroth's method of correcting muscular imbalances by strengthening the lengthened (weak) muscles on the convexity of the curve and incorporating stretching exercises to the shortened concave side. Tapotement techniques were used to stimulate the weak and lengthened side, while Swedish techniques were used to decrease pain on the concave side based on research conducted by Furlan et. al (2008). Ten minutes of deep moist heat from a hydrocolator was also used based on the findings of the French et. al (2006). Before the treatments proceeded and after the final treatment the Oswestry disability index was used for long term pain assessment as did the buffalo study when comparing disability before and after scoliosis surgery. Short-term pain assessment was detected by a pain scale of 0-10, zero

representing no pain at all and ten representing the worst pain ever experienced. Larry D. Playfair MD, FRCPC dictated the patient's scoliosis on November 10 2007 as "There is a moderate scoliosis convex to the left which is centered at about T12. The angle measures about 48 degrees measured from the bottom of T10 and the top of L3. There is a compensatory dorsal scoliosis convex to the right which measures about 34 degrees between top of T6 to the top of T10." Progression of the curve since the date noted is likely to have occurred based on the nature of the patients scoliosis and lack of any treatment from this date. [See appendix B]

SPECIFIC DATA FROM TREATMENT

Patient History

[See Appendix C]

- Patient complains of constant stiffness in the lower back and experiences a sharp, aching pain on the right low back area when standing or sitting for too long.
- Diagnosed with scoliosis in 6th grade (35 years ago).
- Treatment was a shoe lift and unknown exercises that the patient did not comply with.
- Current pain at the time was a 2/10, worst ever felt 8/10, best was a 0/10
- Feels better with changing body movements/position and taking NSAIDS 2-3 times/ week.
- No specific movement pattern makes it feel better or worse
- Broke R clavicle in grade 7 and had an elevated shoulder with arm in a sling for 8 weeks. Fell off a horse when the patient was younger with no known injury.
- Only receives 6 hours maximum/ night of sleep for no specific reason.
- Father has scoliosis (other family members unknown)

- No difficulty breathing
- Right hand dominant

Observations

[See Appendix A]

- Right shoulder moderately higher
- Right iliac crest higher
- Slight lordosis
- Slight hypokyphosis
- Left lumbar/thoracic rib hump with flexion of the trunk
- Right thoracic rib hump with flexion of trunk
- Decreased R iliac to rib 12 height
- Right PSIS lower and L PSIS is higher
- Right ASIS higher and L ASIS is lower

Palpation

- Quadratus Lumborum
- Temperature: Warm
- Texture: Smooth
- Tone: Ropey and Dense
- Tenderness: At right rib 12 insertion

Movement

- Passive and active range of motion was slightly limited compared bi-laterally with right rotation and left lateral flexion.

- Resisted range of motion testing was a grade 5 in all ranges but elicited right low back pain with Right and Left rotation and Right and Left lateral flexion.

Neurological

- No numbness, tingling or weakness noted with these movements.

Referred Pain

- No referred pain was noted.

Special Tests

- Skyline test (+ R upper thoracic rib hump and L lower thoracolumbar rib hump)
- Supine to sit (+ Right post rotation)
- Leg Length discrepancy (+ R=34 ½ inches, L=31 ¾ inches)
- Galezzi test (+ R knee lower)
- Prone knee flexion test for tibia shortening (+ R tibia slightly shortened)
- Hip flexion test for femoral shortening (+ L femur moderately/ severely short)
- McKenzies side glide (-)
- Standing Wall test (-)
- Prone knee bending (-)

Muscle Testing

- Lateral trunk flexors: Left: 2+ Right: 3
- Quadratus Lumborum: Left: 4 (shaking and fatigue) Right: 5

Treatment Goals

- Decrease Lower back pain

- Decrease hypertonicity of right erector spinae below T10 and Quadratus Lumborum
- Stimulate weak Left erector spinae below T10 and Quadratus Lumborum
- Increase circulation to Low back

Treatment Protocol

- 10 minutes heat via hydrocolator to Low Back
- 2 minutes skin rolling to R low back
- 1 minute effleurage bi-lateral low back
- 2 minute open-C kneeding on R low back
- 3 minute deep ulnar border stroking on R Low back
- 1 minute effleurage bi-lateral
- 3 minute knuckle kneeding
- 1 minute effleurage bi-lateral
- 3 minutes fingertip stripping of Right rotatories and multifidi
- 1 minute effleurage bi-lateral
- 2 minutes wringing bi-lateral
- 30 seconds pincement left low back
- 30 seconds point percussion L low back
- 30 seconds hacking L low back
- 15 seconds point percussion L low back
- 15 seconds distal to proximal neural stroking on L Low back

Remedial Exercise

- Right quadratus lumborum stretch on chair: 3x/day for 30 seconds



(Morris & Morris, 2001).

- Left quadratus lumborum strengthening via side trunk lift: 2 sets/ day of 3 reps holding for 25 seconds.



(Dynamic Ergonomics, 2007)

- Core strengthening via posterior pelvic tilt: 2x/ day of 3 reps holding for 25 seconds

(Harris, 2009)



- Core and back strengthening via Bi-lateral leg and arm raise from the hands and knees position: 2x/ day of 3 reps holding for 25 seconds



(Dynamic Ergonomics, 2007)

Hydrotherapy

- Warm bath for 15 minutes 1x/day

Management plan

- Active problems
 - 1) Scoliosis causing lower back pain
 - 2) Hypertoned erectors and quadratus lumborum on right low back
 - 3) Weakened erectors and quadratus lumborum on left low back
- Domain of involvement is pain and decreased range of motion in the axial joint.
- No conditional factors
- Treatment modality: Swedish massage regionally (1,2 and3), heat (1) and tapotment (3)
- Treatment goals:
 - Decrease low back pain
 - Stimulate left low back erectors and quadratus lumborum

- Decrease hypertonicity in the right low back erectors and quadratus lumborum
- Increase circulation to the lower back
- Outcome markers:
 - Patient feedback
 - Increased strength of left lateral flexors
 - Palpation and visual
 - Visual hyperemia

TREATMENT RESULTS AND PROGNOSIS

The purpose of the treatments was to see if Swedish massage could decrease the amount of pain experienced in a patient with idiopathic scoliosis. The first testing method was the Oswestry Low Back Pain Questionnaire. Before the patient received any treatment, her disability index was 26%. After the final treatment the disability index was recorded as 18%. A drop of 8% was noted after five treatments. Moderate disability is scored between 20-40%, which is what the patient recorded pre-treatment, is termed as such by Fairbanks (2000) as

“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, sexual activity, and sleeping are not grossly affected, and the back condition can usually be managed by conservative means”

Minimal disability is scored between 0-20%, which is what the patient recorded post treatment, is termed as such by Fairbanks (2000) as

“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 (typist, driver, etc.)”

The second testing method was a subjective pain scale. The pain scale before and after each treatment is noted here: 1) 2/10, 1/10 2) 1/10, 1/10 3) 1/10, 1/10 4) 1/10, 0/10 5) 1/10, 0/10. The patient experienced no pain after the fourth and fifth treatment and a noted decrease in lower back stiffness.

SUMMARY AND CONCLUSION

After five treatments of Swedish massage, a noticeable decrease in pain was noted through the Oswestry Low Back Pain Questionnaire. Also there was an immediate decrease in pain in 3/5 treatments noted by a pain scale of 0-10. More research and a larger sample size is still needed to discern if similar results could be obtained. The study could have been made more successful by a follow up on the patient a week after treatment, three months after, six months after, nine months after and finally a year after or even longer to see the full results of the treatment. Also, a goniometer could be used to see if range of motion was improved. There was no baseline measurement conducted in this study, so there was no way to prove an increase even though it was noted visually by myself and the patient. The study could have also been made more effective if the patient had a predictable consistent level of activity for the whole five weeks instead of a variance of activities. If an etiology is eventually discovered for structural scoliosis, a proper treatment protocol could be created upon this finding instead of a variance of modalities and therapeutic exercises. Until then, more studies must be done to continue to discover correlations that will hopefully point to a cause and safe treatment of this condition.

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APPENDIX: A



*Notice a left lower (lumbar/thoracic) and a right upper (thoracic) rib hump.



*Notice a longer right femur.

All personal images were used with patient consent

APPENDIX: B



*34.3 degree thoracic curve



*47.4 degree lumbar/
thoracic curve

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