



# Clinical Case Report Competition

West Coast College of Massage Therapy,  
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Second Place Winner

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Decrease of pain and neurological symptoms due to a disc herniation and partial discectomy at the L5-S1 intervertebral disc using therapeutic massage: A case study

To the author's knowledge, no conflict of interest exists.

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## **Decrease of pain and neurological symptoms due to a disc herniation and partial discectomy at the L5-S1 intervertebral disc using therapeutic massage: a case report.**

### **ABSTRACT:**

**Objective:** To present the clinical features of sciatic pain due to a disc herniation and partial discectomy of the L5-S1 intervertebral disc using therapeutic massage: Myofascial Release (MFR), Muscle Energy Techniques (MET), General Swedish Massage (GSM), Myofascial Trigger Point Release (TPR), and Therapeutic Exercise.

**Methods:** Ten sixty-minute therapeutic massage treatments were administered over the course of ten weeks. The focus of treatment was to decrease fascial adhesions of the lower back and posterior leg, decrease pain and muscle tension across the whole back, and encourage reintegration of the left side of the body. Therapeutic exercises were designed to promote stabilization of the patient's core and to decrease the fascial tension of the posterior leg. Assessment techniques utilized were active and passive range of motion of the lumbar spine, manual muscle testing of the lumbar spine, and special tests to evaluate the patient's muscular imbalances and neurological symptoms.

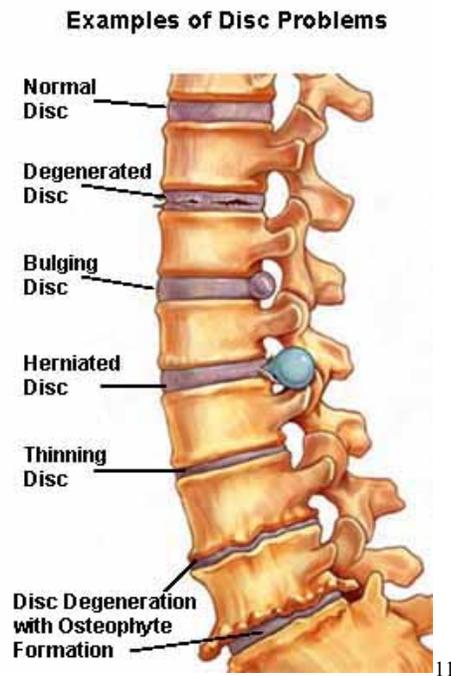
**Results:** The patient reported a notable decrease in sciatic symptoms immediately following treatment. This relief lasted for a varying amount of time. Increases in both active and passive pain free ranges of motion were achieved.

**Conclusion:** The use of therapeutic massage resulted in temporary relief of pain and neurological symptoms caused by persistent sciatica due to a disc herniation at L5-S1. Although there were improvements in the patient's overall presentation as well, it is inconclusive as to whether or not it was due to therapeutic intervention or external factors. Further studies are encouraged.

Keywords: massage therapy, muscle energy, myofascial release, general swedish massage, myofascial trigger point release, sciatica, disc herniation, discectomy, core stability

## Introduction:

Degenerative Disc Disease (DDD) is degeneration of the annular fibres of the intervertebral disc (IVD)<sup>9</sup>. Although gradual breakdown of these fibres is considered to be a normal part of the aging process, when the degeneration occurs in the earlier stages of life it is considered to be pathologic. As the fibres break down and the consistency and shape of the disc begins to change, the inner portion of the disc, the nucleus pulposus, is able to migrate towards the outside of the IVD where it has the capacity to put pressure on the spinal nerve roots and cause further damage. Herniation of the disc is the most common presentation of this situation. Herniation at L4-L5 or L5-S1 accounts for 98% of all low back disc injuries. It may be caused by one single severe strain, repeated micro strains or sustained posture in a compromising position<sup>9</sup>.



As the herniating disc puts pressure on the nerve roots, the patient will most likely develop a deep, poorly localized ache that is worsened by activities that increase interdiscal pressure, (flexion, sitting, coughing, and standing from a seated position)<sup>9</sup>. As the condition worsens, compromising neurological structures becomes a concern. Muscle

weakness corresponding to myotome innervations will present, and sensory changes such as numbness or pins and needles will follow specific nerve root dermatomes. (See Appendix A for diagram of the lower extremity dermatome distribution.) This paresthesia begins at the distal end of the nerve and works its way back towards initial injury site. When the nerve roots of the sciatic nerve are involved (L4-S3) the term ‘sciatica’ is often used to describe the clinical presentation.

Sciatica is often characterized by the following symptoms:

- Unilateral gluteal pain or in one leg that is worse when sitting
- Burning or tingling down the leg
- Weakness, numbness or difficulty moving the leg or foot
- A sharp pain that may make it difficult to stand up or to walk

The affected spinal level is usually tender on palpation on the same side as the disc herniation. Sciatic nerve course may also be tender. Muscle guarding of low back and posterior leg is common, and in extreme cases muscular atrophy may present. Pain with bowel and bladder function is also common as bearing down increases pressure on the IVDs.

Conservative treatment begins with pain relief medications such as acetaminophen, anti-inflammatory agents, and muscle relaxants. Bed rest, low impact activity and physical therapies designed to decrease interdiscal pressure are often prescribed. Laxatives are prescribed to relieve pain related to proper bowel function.

After acute symptoms subside (usually within two to three weeks), patients are encouraged to begin a daily exercise regimen. This may include low impact aerobics, core stability and daily back exercises.

If symptoms of lumbar DDD persist despite these non-operative treatments, further diagnostic tests may be necessary. These tests may include an MRI, CT Scan, Myelogram, and possibly Discography. If the surgeon discovers that one or more of the vertebral discs are damaged and are causing pain or other symptoms (weakness in muscles, or paresthesia), surgery may be necessary. The surgical procedure is likely to include a discectomy (removal of the degenerated disc) and interbody fusion (fusing together of the vertebrae above and below the removed disc).

## CASE REPORT

### **Clinical Presentation:**

Patient is a twenty-four year old female who is currently a full-time university student. She spends anywhere from six to twelve hours a day, six days a week, sitting in a lecture hall or in front of the computer. The patient has a history of skin cancer, which resulted in removal of several lymph nodes in 2006, but otherwise describes herself as being of good health and fitness. She has a family history of Degenerative disc disease (DDD) going back two generations on her mother's side. In July of 2009 she developed low back pain and neurological symptoms down her posterior left leg. The pain was described as having a gradual onset and was thought to be due to the repetitive forward flexion that the patient endured while working as a tree planter that summer. Treatment was initially sought after symptoms had not subsided upon cessation of the work season. By September of 2009, the patient described her pain as being a constant ache, without relief and with bouts of acute 'stabbing' pain upwards of twenty times per day. These episodes were quantified on a numeric pain as being a 7/10 (0 meaning no pain, and 10 being excruciating.) MRI and CT scan at this time showed disc protrusions at L3-L4 and L4-L5, bone spur at L4-L5, and herniation of L5-S1.

Through the fall of 2009 the patient sought several types of physical therapy intervention. She reported seeing a chiropractor once a week and a physiotherapist once or twice a week. In November she received two injections of cortisol, which yielded no relief. On January 25<sup>th</sup>, 2010, the patient underwent a surgical procedure to remove the herniated portion of her L5-S1 intervertebral disc. The result was one month of relief, after which the pain and paresthesia gradually returned. An MRI one month post-operative showed that no further herniation had occurred and it was explained to her that her symptoms were most likely due to a build up of scar tissue around the affected nerve roots, a common result from having had such a procedure.

Upon initial presentation to the author on September 17, 2010, the symptoms were described as a constant discomfort with occasional stabbing episodes caused by fatigue or overexertion. Overall the severity of pain had decreased to an average of 2/10 on the

numeric pain scale. The patient reported that discomfort had decreased in her lower leg and become more centralized to the left gluteal and low back region. She no longer had severe pain related to bowel and bladder function. Lack of sensation across the ball of the left foot remained. Patient reported that symptoms would gradually increase during the day and were significantly aggravated by any sort of sitting, twisting or bending movements.

**Physical Exam:**

Visual scan revealed no significant asymmetries in boney landmarks of the pelvic girdle or lower extremities. There were no sign of bruising or discolouration of the skin. The scar from the partial discectomy was located 3cm to the left of the spinous processes of the L4 and L5 vertebrae and ran for 4cm parallel to the spine. The fascia surrounding the scar was assessed and thought to move with the mobility of a functional scar.

Musculature was observed in standing position and with the patient lying on the table, no muscle wasting, atrophy or significant asymmetries presented in either position.

Palpation of the low back showed tenderness on palpation (TOP) along the inferior lateral angle of the sacrum and iliac crest of the ilium on the left side. Hypertonicity of the deep lateral rotators, most notably piriformis, presented in ropey bands across the left gluteal and referred pain down the posterior leg. The tricep suri muscle group presented as sinewy and seemed slightly shrunken when compared to the right. Patient had decreased sensation to the plantar surface of the foot, centralizing at the ball of the foot and between the first and second toe on the dorsal surface.

Patient was able to complete active range of motion (AROM) of the lumbar spine, noting only slight discomfort in lateral flexion and rotation to the left. Passive range of motion (PROM) showed similar results with painful arcs reported before end range in lateral flexion and rotation to the left. Manual muscle testing of the lumbar spine showed slight weakness in lateral flexion to either side (left=4.0, right=4.5) and while rotating to the left (4.0), though pain was reproduced only while side bending to the left (1/5). (See Appendix C: Manual Muscle Testing)

Orthopedic Testing: Orthopedic testing of the lumbar spine and nerve roots showed irritation of the L5-S1 nerve roots. L5 and S1 myotomes were positive as well as a straight leg raise at 70°. Core test and unilateral squat test performed in treatment 2 showed lack of stability in core and lower extremity stabilizers respectively. (See Appendix C for descriptions of orthopedic tests)

Questionnaires were administered to evaluate the patient's pain experience and perceived functional limitations.

**Clinical Impression:**

Patient presents with signs and symptoms consistent with sciatica due to a lumbar disc injury and nerve root involvement. This is supported by findings from both magnetic resonance imaging and author's manual testing of lumbosacral myotome and dermatome patterns.

**Treatment:**

Treatment plan objectives were explained and informed consent was obtained prior to the start of each treatment. The goal of the initial treatment was primarily to assess patient presentation and to introduce therapeutic massage. The treatments that followed focused on using myofascial release (MFR) techniques to decrease the scar tissue surrounding the nerve roots of the lower lumbar spine. Upper back and cervical spine muscle groups were also attended to at this time as patient had been feeling a significant amount of pain in the area of late. She believed that this pain had also stemmed from having to sit and lean awkwardly in her desk to appease her sciatica. When the low back and thoracolumbar fascia was thought to have been adequately addressed, the treatment continued down through the muscle groups of the posterior lower extremities. Deep fascial stripping of the glutes, deep lateral rotators and hamstring groups decreased adhesions and allowed for increased inter- and intramuscular space. When areas of increased pain or neurological symptoms were discovered, therapist used less aggressive techniques such as crosshands or shearing to improve pliability of the surrounding fascia.

Trigger point (TP) therapy was integrated with the MFR to treat areas of muscles that exhibited increased hypertonicity and/or pain. Standard TP protocol was followed and each area of increased pain was held until patient described a decrease in pain or a numbing sensation. Each TP was worked into a minimum of three times; each time working progressively deeper. Muscle groups that referred into the sciatic nerve pain distribution were of detailed consideration.

Muscle Energy Techniques (MET) were utilized to increase segmental mobility and correct positional faults.

Massage of the left foot was included in treatment protocol to stimulate remaining sensory nerve endings for proprioception, to unwind the superficial fascial back line at the plantar fascia attachment, and encourage integration of the left side of the body.

Therapist used attachment release of peroneus longus and tibialis anterior, and GSM to achieve these goals.

Therapeutic exercise focused on retraining stability and strength of core muscles. The posterior fascial lines were addressed using a tennis ball to release the plantar fascia by self-massage, by doing so the patient was able to lengthen the connecting superficial back lines of fascia as well as stimulate the sensory nerve endings of the foot. Patient was encouraged to continue with yoga practice as long as no further aggravation of condition occurred. Full forward flexion and postures with bending and rotation of the low back were discussed. Modifications to home and school ergonomics were suggested.

(See Appendix E for full description of therapeutic exercises.)

### **Differential Diagnosis:**

Spinal stenosis, spondylolisthesis, benign or malignant tumours, piriformis syndrome and infection are also causes of sciatic pain. These conditions were discounted based on the results of both a CT and MRI. Patient's family history of DDD and reaction to surgery further support the initial diagnosis of DDD leading to disc herniation.

**Results:**

Pre-treatment ranges of motion showed increases in both overall available AROM and PROM.

Table 1: Lumbar Spine Active Ranges of Motion (AROM)

| L/Sp AROM           | Treatment 1 | Treatment 5 | Treatment 8 | Treatment 10 |
|---------------------|-------------|-------------|-------------|--------------|
| Forward Flexion     | 40          | 45          | 45          | 45           |
| Extension           | 30          | 30          | 35          | 37           |
| Lateral Flexion - L | 15          | 13          | 13          | 15           |
| Lateral Flexion - R | 18          | 16          | 16          | 18           |
| Rotation - L        | 15          | 14          | 14          | 15           |
| Rotation - R        | 15          | 13          | 13          | 15           |

(Appendix C: Expected ranges of motion of the lumbar spine)

Gains were made in overall available pain-free AROM in flexion of 5°, and in extension of 7°. All other ranges decreased during course of treatment, but ended with gains from their lowest points.

Table 2: Lumbar Spine: Passive Range of Motion (PROM)

| L/Sp PROM           | Treatment 1 | Treatment 5 | Treatment 8 | Treatment 10 |
|---------------------|-------------|-------------|-------------|--------------|
| Forward Flexion     | WNR         | WNR         | WNR         | WNR          |
| Extension           | WNR         | WNR         | WNR         | WNR          |
| Lateral Flexion - L | 10          | 10          | WNR         | WNR          |
| Lateral Flexion - R | WNR         | WNR         | WNR         | WNR          |
| Rotation - L        | 10          | 10          | WNR         | WNR          |
| Rotation - R        | WNR         | WNR         | WNR         | WNR          |

\* WNR- Within normal range

(Appendix C: Expected ranges of motion of the lumbar spine)

Therapist was able to move patient through complete PROM of the lumbar spine to firm end feel without discomfort in treatments 8 through 10.

Table 3: Manual Muscle Testing (MMT) of Lumbar Spine Musculature

| L/Sp MMT            | Treatment 1 |     | Treatment 5 |     | Treatment 8 |     | Treatment 10 |   |
|---------------------|-------------|-----|-------------|-----|-------------|-----|--------------|---|
| Grade/ Pain Scale   |             |     |             |     |             |     |              |   |
| Forward Flexion     | 5.0         | 0   | 5.0         | 0   | 5.0         | 0   | 5.0          | 0 |
| Extension           | 5.0         | 0   | 4.5         | 0   | 5.0         | 0   | 5.0          | 0 |
| Lateral Flexion - L | 4.0         | 1.0 | 4.0         | 1.5 | 4.5         | 0   | 4.0          | 0 |
| Lateral Flexion - R | 4.5         | 0   | 5.0         | 0   | 5.0         | 1.0 | 5.0          | 0 |
| Rotation - L        | 4.0         | 0   | 4.0         | 1.0 | 5.0         | 0   | 5.0          | 0 |
| Rotation - R        | 5.0         | 0   | 4.5         | 0   | 4.5         | 1.0 | 5.0          | 0 |

(Appendix C: MMT Values)

Table 3 shows an increase in strength lateral flexion to the right and rotation to the left, as well as a decrease in pain felt in various ranges.

Table 4: Squat Test

|       | Tx.1 | Tx.2 | Tx.3 | Tx.4 | Tx.5 | Tx.6 | Tx.7 | Tx.8 | Tx.9 | Tx.10 |
|-------|------|------|------|------|------|------|------|------|------|-------|
| Right |      | -    | -    | -    | -    | -    |      | -    | -    | -     |
| Left  |      | +    | +    | +    | +    | +    |      | -    | -    | -     |

(Appendix C: Squat Test)

Table 4 exhibits the patient’s ability to control movement while doing a one legged squat. Positive tests denote that the patient was unable to control the muscles of the hip properly and the stronger hip abductors were overtaking the weaker adductor muscle group. The knee was tracking medially during motion. By treatment 8 the patient was able to perform a one legged squat with the knee moving towards the floor in a controlled and perpendicular pattern. During this test the quadriceps are active for knee extension and

patella control, hamstrings for knee stability and hip extension, the gluteals for hip extension and abduction, and the adductors and gluteal deep six for hip stabilization.<sup>6</sup>

Table 5: Plank Test

|             | Tx.1 | Tx.2 | Tx.3 | Tx.4 | Tx.5 | Tx.6 | Tx.7 | Tx.8 | Tx.9 | Tx.10 |
|-------------|------|------|------|------|------|------|------|------|------|-------|
| Time (Sec.) | -    | -    | 30   | 35   | 25   | 25   | 15   | 37   | 45   | 40    |

(Appendix C: Plank Test)

The patient’s ability to hold plank position for an increasing amount of time shows and increase in core stability and strength. Significant drops in ability to hold position coincide with bouts increased sciatic pain due to external aggravating factors.

Straight leg raise test (SLR) was administered in treatments 1, 2, 5, 8, and 9. Treatment 8 and 9 showed an increase 3° and 5° respectively from pre-treatment to post-treatment measurements.

Outcome measures showed a score of 26% on the Revised Oswestry low back pain questionnaire. This result suggests that the patient perceives herself as moderately disabled by the severity of her back. The Dallas pain questionnaire suggested that the patient would benefit from medical intervention, but that no behavioural treatment was necessary. (See appendix B: Outcome measures)

**Discussion:**

It became apparent through the course of treatments that the severity of sciatic pain had a direct correlation with the stress and workload of the patient’s academic endeavors.

There were definite increases in both pain and neurological symptoms as the patient went through midterms, and then again during final exams. Not only did the pain become more intense, it seemed to become more widespread as well. During these times the patient decreased or completely stopped doing her homecare and yoga practice. Despite the patient’s awareness of how crucial it is to maintain core strength and stability, and limit the time spent in aggravating positions, she was unable to do so during the weeks

surrounding exams. When the stresses of school were low, and she was able to pursue extra-curricular activities, her pain decreased. This was most apparent in treatments 2, 3,4,7, 8 and 9. Treatment plans developed for chronic conditions such as DDD are very much dependent on the patient's willingness to adhere to therapeutic exercise and make modifications to current living conditions.

The symptoms involved with sciatica are multi-faceted, and seem to have an arsenal of ways in which to attack the body on a daily basis. Without the patient's diligence to therapeutic exercise it became impossible to establish a foundation off of which to build a progressive treatment plan. The treatment plan had to constantly change to manage current symptoms and maintain standard of living. Her inability to avoid aggravating factors is likely to be what has lead this condition to an almost systemic presentation. It was obvious to the therapist during the short interview at the beginning of each treatment, just how uncomfortable it was for the patient to sit, even for a short time. She would shift in the chair, and fidget in attempts to find a comfortable position. Considering that the interview never lasted more than 5-10 minutes, it is imaginable how uncomfortable it must be to sit through a 3-hour lecture or to study for 5-6 hours straight. Ergonomic changes were suggested, but no significant modifications were made. (See Appendix E) MET was used by the therapist in hopes to encourage segmental mobilization of the lumbar spine facet joints. The patient was uncomfortable sitting in the position required for the technique and because of the constant underlying pain, she was unable to appreciate any sense of relief that such a minute adjustment may have. Because of patient's resistance to technique, it was not as effective as initially hoped. Modifications in further studies would be recommended.

Treatment 10 consisted of GTO release techniques that concentrated on the release of muscle groups along traditional Chinese meridians (See Appendix D: Treatment 10.) Because these techniques were beyond the scope of practice of this novice therapist they were omitted from further treatments; however, patient's reaction to techniques was very positive and it is the author's belief that such massage would benefit someone dealing with sciatic pain. Further studies would be recommended.

Throughout the course of this study, the therapist encouraged the patient to quantify her pain using the VAS pain scale. The patient found it difficult to quantify her symptoms on

a scale for pain because of the paresthesia component. It proved to be an unreliable measure, and was abandoned as an assessment method.

Orthopedic testing was done without the use a goniometer, further studies would benefit from using one to ensure accuracy of measurements for data collection.

**Conclusion:**

The use of therapeutic massage resulted in temporary relief of pain and neurological symptoms caused by persistent sciatica due to an intervertebral disc herniation at L5-S1. Although there were improvements in the patient's overall presentation as well, it is inconclusive as to whether or not it was due to therapeutic intervention or external factors, or if the effects would be prove to be long term. Further studies are encouraged.

## **Acknowledgments**

I would like to thank the patient for her time and dedication to this case report.

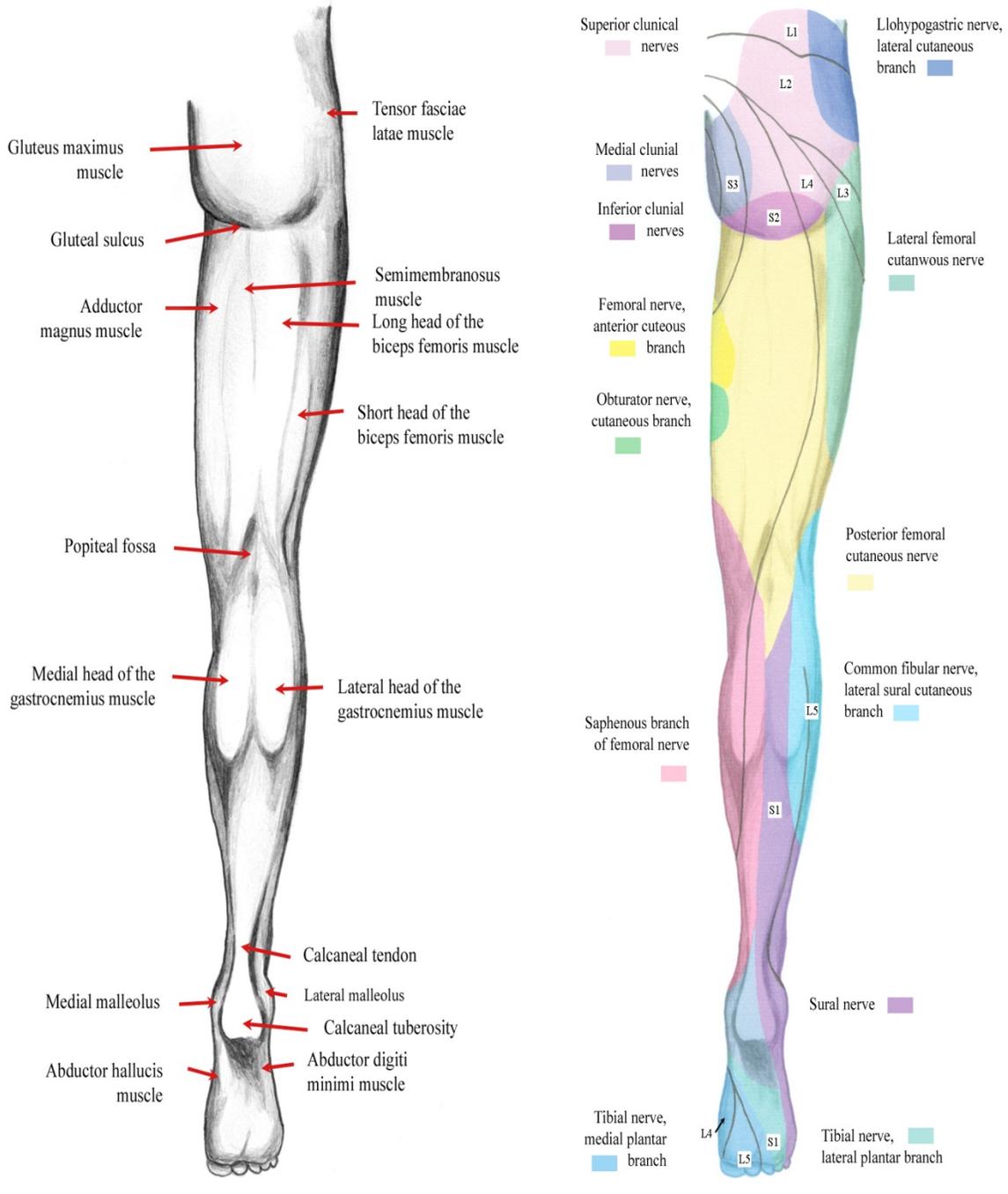
I would also like to extend a sincere thank you to the instructors and clinic supervisors of WCCMT, Victoria for their guidance and support.

## References:

1. Davey E. Myofascial Release II- Lecture Notes: WCCMT 2010.
2. Hertling D, Kessler RM. Management of Common Musculoskeletal Disorders. 4<sup>th</sup> Edition. Pennsylvania, USA. Lippincott Williams & Wilkins: 2006.
3. Hoppenfeld S. Physical Examination of the Spine and Extremities. Connecticut, USA. Appleton and Lange: 1976. Page 256
4. Kisner C, Colby LA. Therapeutic Exercise. 5<sup>th</sup> Edition. Pennsylvania, USA. F.A.Davis Company: 2007.
5. Magee DJ. Orthopedic Physical Assessment. 5<sup>th</sup> Edition. Missouri, USA. Saunders: 2008. Page 559-564, 637
6. McGill S. Ultimate Back Fitness and Performance. 4<sup>th</sup> Edition. Ontario, Canada. Wabuno Publishers, Backfirpro Inc: 2004.
7. Myers TW. Anatomy Trains: Myofascial Meridians for Manual and Movement Therapists. 2<sup>nd</sup> Edition. Churchill Livingstone: Elsevier: 2009. Page 74, 76, 82
8. Netter F. Atlas of Human Anatomy. 4<sup>th</sup> Edition. Pennsylvania, USA. Saunders Elsevier: 2006.
9. Rattray F, Ludwig L. Clinical Massage Therapy. Ontario, Canada. Talus Incorporated: 2005. Chapter 47-Degenerative Disc Disease. Page 617-636.
10. Travell JG, Simons D. Myofascial Pain and Dysfunction: The Trigger Point Manual, Vol. 2: The Lower Extremities. Pennsylvania, USA. Lippincott, Williams & Wilkins: 1999
11. <http://www.spineuniverse.com/conditions/degenerative-disc/what-degenerative-disc-disease>
12. <http://emedicine.medscape.com/article/791613-media>
13. <http://www.sdspineinstitute.com/index.php/conditions/cervical-disc-herniation/>
14. <http://www.prohealthsys.com/products/images/FC-sciatic%20nerve.jpg>

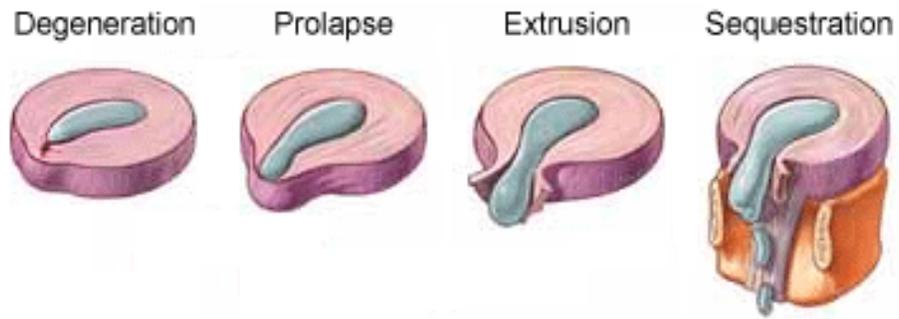
**Appendix A: Illustrations**

**Diagram 1: Muscle groups, surface anatomy, peripheral sensory innervations, and dermatomes of the posterior lower limb.**



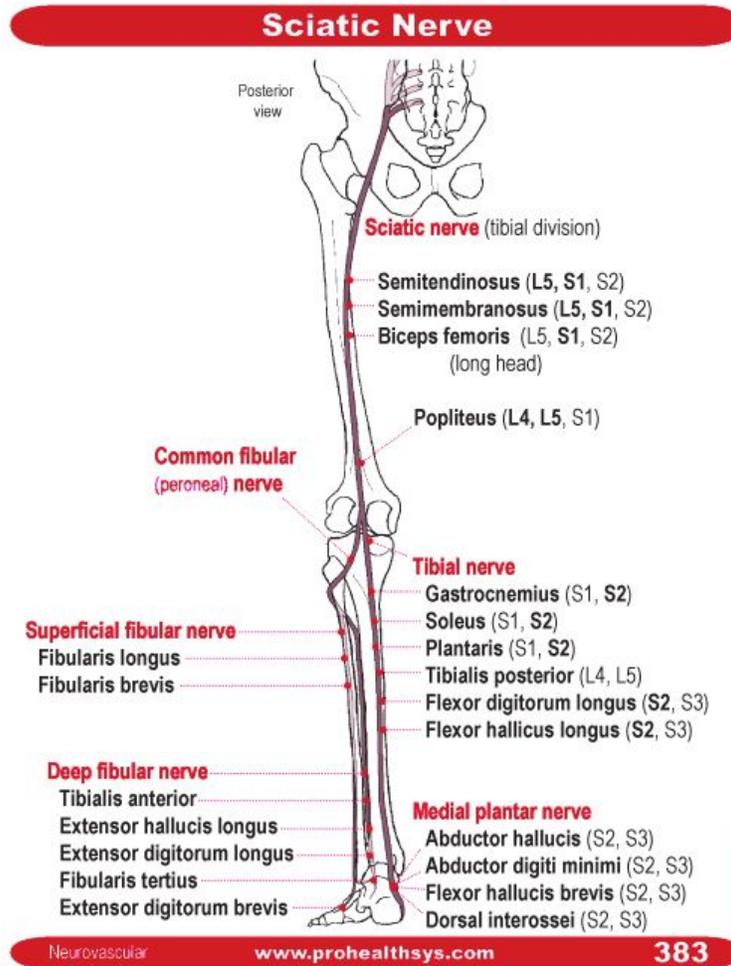
<http://emedicine.medscape.com/article/791613-media>

**Diagram 2: Stages of Disc Herniation**



<http://www.sdspineinstitute.com/index.php/conditions/cervical-disc-herniation>

**Diagram 3: Sciatic nerve pathway and innervations**



<http://www.prohealthsys.com/products/images/FC-sciatic%20nerve.jpg>

## **Appendix B: Outcome Measures**

### **Dallas Pain Questionnaire**

Purpose: To assess the impact of chronic pain on patient's lives

Administration: Each of the 16 items contains its own visual analogue scale. The scales are divided into five to eight small segments in which a patient is asked to mark an 'X' to indicate where the pain impact falls on that continuum.

Scoring: Scoring of the four general factors is accomplished by assigning values to each item of 0 to the left-hand segment, 1 to the next segment, 2 to the next segment and so on. Individual ratings are summed and multiplied by a constant for a percentage of how the pain impacts the patient's daily life.

Above 50 percent is considered to be of "significant" interference.

If section I and II are above 50% and section III and IV are below, medical interventions alone appear to be beneficial. If the reverse is found, it is thought that a behavioral approach would be better indicated.

When all factors are above the 50<sup>th</sup> percentile- both medical and behavioral approaches should be considered.

### **Oswestry Pain Questionnaire**

Objective: To measure the patient's perception of functional limitations.

Administration: The patient marks the one statement in each section that best describes his or her disability.

Scoring: Each section is scored on a 0-5 scale, with 5 representing the greatest disability. The score of all the sections are added together, and doubled in order to get a percentage.

0-20%: Minimal disability

20-40%: Moderate disability

40-60%: Severe Disability

60-80%: Crippled

80-100%: Bed bound or displaying exaggerated or inappropriate illness behavior.

## Appendix C: Physical Exam and Special Tests

### Expected Ranges of Motion of the Lumbar Spine <sub>5</sub>

| Action                            | Degrees of Motion |
|-----------------------------------|-------------------|
| Forward Flexion                   | 40- 60°           |
| Extension                         | 20- 35°           |
| Lateral Flexion- (right and left) | 15- 20°           |
| Rotation- (right and left)        | 3- 18°            |

### Manual Muscle Testing Values <sub>5</sub>

| Grade | Value         | Movement Grade  |
|-------|---------------|---|
| 5     | Normal (100%) | Complete ROM against gravity with maximal resistance    |
| 4     | Good (75%)    | Complete ROM against gravity with moderate resistance   |
| 3+    | Fair +        | Complete ROM against resistance with minimal resistance |
| 3     | Fair (50%)    | Complete ROM against gravity                            |
| 3-    | Fair -        | Some, but not complete ROM against gravity              |
| 2+    | Poor +        | Initiates motion against gravity                        |
| 2     | Poor (25%)    | Complete ROM if gravity is eliminated                   |
| 2-    | Poor -        | Initiates motion if gravity is eliminated               |
| 1     | Trace         | Evidence of slight contraction<br>No joint mobility     |
| 0     | Zero          | No contraction is palpable                              |

## Special Tests

### Straight Leg Raise <sub>3</sub>

|                         |   |
|-------------------------|---|
| Tests For               | Traction on sciatic nerve, lumbosacral nerve roots and dura mater   |
| Patient                 | Supine, passive   |
| Therapist               | Flexes the hip until patient complains of pain or increased neurological symptoms in back or posterior leg. |
| - /Normal reaction      | Test administered with no recreation of symptoms  |
| Positive test           | Pain between 35° and 70° of hip flexion   |
| Positive sign indicates | Intervertebral disc protrusion  |

### Plank Test

|                         |  |
|-------------------------|--|
| Tests For               | Core stability/strength  |
| Patient                 | Lifts off ground onto toes and forearms, back remains straight |
| Therapist               | Observes and times   |
| - /Normal reaction      | Patient is able to hold in proper position for 1 minute        |
| Positive test           | Shaking, quivering, or inability to hold position              |
| Positive sign indicates | Body is recruiting phasic muscles to assist in stabilization   |

### Squat Test <sub>6</sub>

|                         |  |
|-------------------------|--|
| Tests For               | Muscular imbalances in the hip abductors and adductors   |
| Patient                 | Stands on one leg, slowly lowers into a squat  |
| Therapist               | Observing- eyelevel with patient's knee  |
| - / Normal reaction     | Patient is able to do a controlled one-legged squat while keeping knee in alignment with hip and foot. |
| Positive test           | Knee tracks medially or laterally  |
| Positive sign indicates | Muscular imbalances between abductor and adductor groups of the lower extremities                      |

Piriformis Length Test 5

|                         |  |
|-------------------------|--|
| Tests For               | Tight piriformis muscle  |
| Patient                 | Prone, knees flexed bilaterally, passive   |
| Therapist               | Stabilizes patient's lower legs and then allows them to fall outwards the long edge of the table |
| - /Normal reaction      | Feet fall equal distance to table  |
| Positive test           | One leg falls farther towards the table than the other   |
| Positive sign indicates | Tight piriformis muscle on the side that decreased range   |

Gillets/ Ipsilateral Anterior Rotation Test 5

|                         |   |
|-------------------------|---|
| Tests For               | Hypomobilty or hypermobility at the SI joint  |
| Patient                 | Standing, actively moves hip into flexion and then extension  |
| Therapist               | Kneels behind patient, one thumb on the PSIS of the hip in motion, one thumb on the second segment of the medial sacral crest |
| - /Normal reaction      | Thumb on the PSIS of the leg that is flexing/extending will move (inferiorly with flexion/ superiorly with extension)         |
| Positive test           | Minimal movement or movement opposite to expectation  |
| Positive sign indicates | Hypomobility of the SI joint  |

## **Appendix D: Treatment assessment, methods, and patient reactions recorded in depth**

**Treatment 1:** Treatment 1 focused on assessment of the lumbar spinal segments and surrounding musculature. Postural assessment showed level iliac crests, as well as anterior and posterior superior iliac spines (ASIS/PSIS). Primary area of concern was established as being the left lower lumbar and sacral region. Pain ran down the posterior leg with increased tenderness on palpation (TOP) at the bicep femoris insertion (the head of the fibula, the lateral condyle of the tibia and the fascia of the lower leg.) Resisted planter flexion of the left ankle showed significant weakness, as did extension of the left big toe. Limitations in both AROM and PROM were discovered- most notably in left lateral flexion and rotation. Testing showed ample range and strength in hip flexors. The incision scar was assessed using a compass style technique in which the therapist places a hand onto the area of the scar and with firm pressure attempts to move the skin in all directions, noting any discrepancies in the skin's ability to move. Gentle picking up and skin rolling of the scar showed a slight increase in the adhesion of the left lumbar fascia when compared bilaterally. Gentle MFR and GSM to the whole back was used to determine areas of hypertonicity, to introduce the patient to therapeutic massage and to ensure the patient had no adverse reaction to treatment techniques.

**Treatment 2:** Patient presented with general discomfort through the entire back with definite areas of increased intensity in both the cervical and lumbar areas. This was thought to be related to driving approximately fourteen hours over the course of the weekend. The goals of the treatment were to continue with assessment of the thoracolumbar fascia and low back, treat the superficial back line of fascia and decrease pain across the entire back. Movement of individual vertebral segments was assessed using standard muscle energy techniques (MET). One correction was performed at the right L5 facet joint in order to increase forward flexion. With the patient lying prone and pillowed to provide abdominal and lower back support, the therapist proceeded to use deep fascial techniques to decrease adhesions and increase pliability of the paraspinal muscle groups. Treatment 2 also intended to decrease the scar tissue that adhered to the nerve roots following the surgery. Myofascial release (MFR) shearing was used to release fascial lines of the lateral body, more specifically, along the iliac crest. Trigger points (TPs) in the left Quadratus Lumborum were addressed using ischemic compression techniques. Long, slow, deep fascial stripping continued up the back to encourage integration of the body and address patient's increasing upper back discomfort. MFR work and TPs were reassessed. General swedish massage (GSM) was used to flush the entire back. In a supine position, the therapist performed GSM to the posterior and lateral muscles of the cervical spine and a golgi tendon organ (GTO) release on the cranial attachments of the suboccipital muscles to encourage a release of the superficial back line of fascia. The patient reported feeling sensation down into the left sacroiliac joint. Homecare was established. (See Appendix E)

**Treatment 3:** Patient felt notable decrease in symptoms for two days after treatment 2. There had been no episodes of stabbing pain and patient presented with only slight discomfort in the area of the left QL. No MET corrections were performed. Massage component of treatment replicated treatment 2. TPs were found in the left QL and bilateral Levator Scapulae and again, treated with ischemic compression.

**Treatment 4:** Episodes of stabbing pain and numbness of left foot throughout the week seemed to correlate with long periods of time in a seated position. Treatment consisted of a MET correction at the left facet of L4 to increase flexion. MFR of the low back and hips followed the protocol established in treatment 2. MFR interspersed with TPs continued through the lower gluteal region. Isolytic release was performed on the piriformis on the left side. The patient experienced referred pain during technique, but said afterwards it helped to decrease pain in the area. MFR stripping of the hamstrings and iliotibial band was used to increase space of the posterior and lateral leg compartments, therefore relieving some of the strain put on the sciatic nerve.

A myofascial lumbosacral decompression was attempted by therapist but produced no results and abandoned as a technique for further treatments.

Home care was expanded to include yoga practice modifications.

Patient experienced a lessening in left leg pain and a decrease in numbness of the foot following treatment.

**Treatment 5:** Patient described foot as feeling ‘alive’ following last treatment. Complete relief lasted for approximately one day, and then gradually returned, though remained slightly less than normal. Patient requested that treatment focus on upper back and cervical spine tension. No lumbar MET corrections were done. Treatment consisted of MFR to the levator scapulae, upper trapezius, posterior scalene, and thoracic erector spinae muscles. Gentle fascial stretches were performed to the scalenes and sternocleidomastoid by anchoring the shoulder and manipulating the fascia by movement of the head in the opposing direction. Suboccipital muscles were addressed individually, and then as a group along the superior nuchal line as an attachment for the superficial back line of fascia. TPs in obliquus capitis inferior and superior were addressed. Tennis ball exercises to increase hamstring fascia length were added to therapeutic exercise protocol.

**Treatment 6:** Between treatment 5 and 6 the patient noticed a significant increase in sciatic symptoms. There had been a gap in treatment course due to holidays and clinic availability. Patient had stopped doing therapeutic exercise as well at this time and was spending long hours of the day studying for university exams. Sciatic pain was described as being a string that constantly pulled between left glute and foot. MET correction to increase forward flexion were performed at right L4 and L5 vertebral segments. MFR and TP therapy followed previously established protocol. Attachment release of muscles attaching to the plantar surface of the foot (tibialis anterior and peroneus longus) along with deep fascial work of the plantar fascia was enjoyed by the patient. These techniques proved to stimulate the area of decreased sensation and encourage integration.

**Treatment 7:** Relief after treatment 6 lasted for about 4 days. Treatment 6 was replicated in treatment 7 due to patient’s positive response.

**Treatment 8:** Overall level of pain has been decreasing. Patient has noticed an increase in sensation of the dorsal and lateral aspect of the foot. Orthopedic testing showed no pain or

restriction in PROM. Patient was able to increase time spent in plank position by twenty-two seconds. MFR and TP techniques were applied to the low back, hips and posterior leg. Bilateral traction of the legs relieved tension of the low back and decreased pain.

**Treatment 9:** Patient reported only slight instances of pain through the week. Overall, improvements in core strength and pain levels have been achieved. Because symptoms have become more manageable, treatment goals shifted to a more systemic approach. GSM of the entire back was included. Neural stroking was used to sedate the sympathetic nervous system and gentle traction of the suboccipitals and bilateral legs encouraged unwinding of the superficial back line of fascia.

SLR showed an increase of 5° post treatment.

**Treatment 10:** The focus of treatment 10 was full body integration using acupressure and GTO release techniques as described by Russell Yoshida, Registered Massage Therapist, Acupuncturist and WCCMT Clinic Supervisor.

GTO release techniques were performed by rocking correlating acupressure points along Chinese meridians to decrease muscle tension and improve fluidity of motion of the external rotators of the hips, then the external rotators of the shoulder. The patient was in prone position with pillow support under the feet and stomach. All work was done bilaterally. Then, with patient supine, similar rocking/GTO release was done on the pectorals, deltoids, sternum, and abdominals. Hip flexors were released by hooking the thumbs on the ASIS' of each ilium and instructing the patient to slowly rock bent knees from side to side. Adductors and tricep suri muscle groups were also treated.

Patient described her low back as being able to 'breathe' following treatment. Her hips felt 'open' and 'loose' and there was definite increase in fluidity of motion in the cervical spine. This type of massage was new to the author, making it difficult to describe it in a way suitable for replication. Although the techniques strayed away from original treatment plan modalities it was included in the case report because of the patient's positive response to treatment style and adherence to treatment plan and patient's personal goal of body integration. Further studies, and inclusion in future case reports is recommended.

## **Appendix E: Therapeutic Exercises**

**Plank Exercise:** Start in prone position. Place forearms on ground, creating a 'V' shape. Lift onto your toes. Elbows should be directly underneath your shoulders. The body should be hovering above the ground, only the toes and forearm/hands touching. Back should be kept straight, be sure not to let your hips sag towards the floor. Hold for 30 seconds, working up to 60 seconds if possible.

**Hamstring Fascia Tennis Ball Release:** Begin in standing position. Take a deep breath and sweep the arms up and overhead, gently stretching the fingertips to the sky. Take note here of any asymmetries between the reach of the fingertips. Now place the tennis ball slightly in front of one foot. Place the heel of that foot on top of the tennis ball. Shift your body weight to that heel and press down into the tennis ball. Hold for 5 seconds, and release. Repeat this 5 times. Pull the foot back slightly so the tennis ball rests just slightly anterior to the heel and repeat the compressions. Pull the foot back slightly, so the ball rests in the arch of the mid-foot, and repeat. Then, to the ball of the foot, and repeat. Next, so that just the toes are suspended on the ball and the rest of the foot stays planted on the floor. Each time allowing your full body weight to compress into the tennis ball for the full 5 repetitions of 5 second holds. Again stand with both feet on the ground, hip-width apart, and sweep arm up and overhead. Notice here if there has been any shift in the reach of the hand on the side that has been on the tennis ball. Repeat series of compressions on the contralateral foot. Again, follow this series of compressions with a stretch, observing if the hands are able to reach the same amount again. This exercise focuses on decreasing the tension in the superficial back line of fascia through compressive manipulation of the connecting plantar fascia.

**Yoga Practice:** Patient was encouraged to continue with her yoga practice as long as she was able to modify postures, and caused no further aggravation of the condition. Poses that increase strain on the low back or sciatic nerve (forward folds and/or twists) were discussed and modifications were suggested. Patient was instructed on the importance of engaging core muscles, keeping in a pain free ROM at all times and keeping the knees bent when forward flexing to slack off the superficial back line of fascia (Anatomy trains).

**Ergonomics of study areas:** Throughout the course of treatments, patient and therapist discussed the importance of proper back support and ergonomics of her home study area. Currently the patient sits on a plastic lawn chair at the kitchen table and works on a laptop. While she has researched and looked at several chairs, none have been purchased to this date. At school, and in the car, ergonomics were modified by using a portable 'sit disc' to provide lumbar support. This modification yielded moderate results.

**Appendix F: Records of treatments and patient consultation forms**