MANUAL THERAPY TREATMENT FOR LUMBAR STENOSIS AND ACCOMPANYING RADIATING PAIN

A Case Report

Presented to

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of the Requirement for the Degree of
Doctor of Physical Therapy

By
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MANUAL THERAPY LUMBAR STENOSIS

APPROVAL SHEET

This case report is submitted in partial fulfillment of the requirements for the degree of
Doctor of Physical Therapy

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The final copy of this case report has been examined by the signatories, and we find that both the content and the form meet acceptable presentation standards of scholarly work in the above mentioned discipline.
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Abstract

Background and Purpose: Patients with lumbar stenosis and radiating pain are frequently treated using various forms of manual therapy. This case report study describes a single patient case and the treatment of lumbar stenosis and radiating pain using manual therapy techniques. Case Description: A 53-year-old female presented to outpatient care with 10/10 left lumbar pain and radiating pain present to posterior lateral mid-calf. The patient was in a motor vehicle accident three weeks ago. Symptoms were provoked during right rotation and left lateral flexion of the lumbar spine as well as during prolonged sitting or walking. A multi-modal manual therapy based treatment approach was utilized which included: lumbar spine rotation (Grade II, III) mobilizations, soft tissue mobilization, and therapeutic exercise for lumbar pelvic stabilizer muscle strengthening and neuromuscular control. Outcome: After 12 visits over 5 weeks of treatment, the patient displayed significantly improved strength, range of motion, level of disability, centralization of pain, and reduction of pain. Discussion: While the results described in this case report cannot be generalized, it does depict a successful outcome of a patient with lumbar stenosis and radiating pain using manual therapy techniques and therapeutic exercise.
Background and Purpose

Radiating pain or radicular pain from the spine involves inflammation and chemical changes that will cause increased sensitization of the nerve root or spinal ganglion that results from compression, irritation, or pinching of the spinal nerve root. The radiating pain may be due to disc protrusion, osteophyte formation into the intervertebral foramen, or any local degenerative disorder that compromise the intervertebral foramen including spinal stenosis (Hengeveld & Banks, 2014). Radiculopathy may cause neurological signs or symptoms including: myotomal weakness, changes in sensation in dermatomal patterns, and pain that is described as lancinating, shocking, burning, or of electric qualities (Hengeveld & Banks). Referred pain is perceived at a site other than the painful stimulus. Pain perceived along the distribution of the sciatic nerve in the posterior aspect of the lower extremity is a common referred pain pattern resulting from nerve compression in the lumbosacral spine (Longo, Ropper, & Zafonte, 2015). Conservative treatment including various forms of manual physical therapy management have been demonstrated to be effective in the management of lumbar pain by improving pressure pain thresholds (Willet, Hebron, & Krouwel, 2010). A comprehensive clinical practice guideline was constructed utilizing evidence based research. It was determined that manual therapy interventions are indicated in patients with acute low back and back related lower extremity radiating pain to improve spine and hip mobility as well as reduce pain and level of disability (Delitto et al., 2012). Manual therapy techniques including spinal mobilization have demonstrated positive effects on
the presentation of lumbar radiating pain through pain modulating effects through neural analgesic mechanisms (Dorron et al., 2016). Spinal manipulation has also been demonstrated to address local hypomobility with reduction of compression in the intervertebral foramen (Vieira-Pellenz et al., 2014). It is suggested that conservative management of lumbar radiating pain should be attempted prior to surgical management in the absence of worsening neurological signs or cauda equina syndrome (Valat, Genevay, Marty, Rozenberg, & Koes, 2010). Research has demonstrated that there are positive effects on both range of motion of the lumbar spine as well as pain reduction with various grades of Maitland lumbar manipulation techniques (Bhushan et al., 2016; Shum, Tsung, & Lee, 2013). Likewise, there has also been research concerning the use of soft tissue mobilization on decreasing pain and increasing tissue extensibility (Furlan, Imamura, Dryden, & Irvin, 2009). A recent systematic review of literature also demonstrated that there is evidence for the use of mobilization and soft-tissue manual therapy techniques combined with exercise for both short and long term pain and disability management (Hidalgo et al., 2013). This case report demonstrates the positive effects of conservative physical therapy management with use of manual therapy techniques and interventions in the treatment of lumbar stenosis and accompanying radiating pain.

**Case Description**

**Participant History and Systems Review**

A 53-year-old female presented for physical therapy treatment with severe (10/10) left lumbar spine pain and radiating pain in the left lower extremity that
began after being in a motor vehicle accident. The patient first began having pain after a motor vehicle accident approximately 3 weeks prior to physical therapy evaluation. Diagnostic imaging including a MRI and radiographs were completed after the motor vehicle accident which displayed left L4-L5 spinal stenosis, L4-L5 facet arthropathy, disc bulges on L3-L5, and L4-L5 degenerative disc disease. The patient described her pain as sharp and shooting pain and rated it at 10/10 on the 11-point Numerical Pain Rating Scale (NPRS). She also reported pain into the left lower extremity in the posterior thigh that extended to the posterior lateral mid-calf. No associated numbness, paresthesia, weakness, or cauda equina syndrome symptoms were reported. As a result of this lumbar pain and radiating pain the patient was unable to sleep uninterrupted as well as unable to complete many functional activities without severe increase of pain. Activities that were limited included: prolonged standing, ambulation of community distances, transfers, lifting or carrying objects required for household activities, and recreational activities. The patient was only able to sleep on her right side and her sleep was frequently disturbed by low back pain resulting from turning, rolling, or moving while in bed. The current episode of pain also prevented her from sitting upright at work as an office worker or moving about as needed while at work. The patient felt that she was unable to perform her job adequately due to pain and difficulty with moving secondary to pain. She was anxious concerning her condition and how it may negatively impact her professional, social, and personal life as well as the potential of long-term disability. The patient’s goals for physical therapy were to return to prior level of
function, to resolve her low back pain, and to allow for return to work at the level of previous capacity.

**Clinical Impression #1**

The patient reports severe (10/10) low back pain with radiating left lower extremity pain of spinal origin. There are significant functional limitations secondary to this pain. Due to mechanism of injury as well as the radiating pain pattern there is several potential differential diagnoses including: facet dysfunction, intervertebral disc herniation, spinal stenosis, piriformis syndrome, and sacroiliac joint dysfunction.

The examination plan included: neurological testing, postural assessment, lumbar range of motion, passive intervertebral motion, strength of the lumbar pelvic stabilizers, determination of a flexion or extension directional preference of movement, and neurodynamic testing. Due to the patient presentation of low back pain with mobility deficits it was determined that, based on evidence based research, there was likely to be functional improvements through the use of manual therapy techniques including spinal and soft tissue mobilization as part of a multi-modal conservative approach.

**Examination**

The patient completed the Revised Oswestry Disability Index (ODI). She scored 70%, which indicates complete disability. Physical examination of the patient was limited due to the severity of the patient’s pain and irritability of affected structures. She was observed to have forward flexed posture, increased lumbar lordosis, rigid posturing, and antalgic motions secondary to severe low
back pain. There was an increase of localized left lumbar pain at end range motion in all directions of the lumbar spine. Right rotation and left lateral flexion also increased left lower extremity radiating pain. Range of motion was significantly limited in all directions secondary to pain at end range with greatest limitations in right rotation and left lateral flexion. Pain was most severe with right rotation and left lateral flexion with recreation of radiating lower extremity pain to posterior lateral mid-calf. The patient reported a decrease in pain with slight flexion, right lateral flexion, and left rotation. Palpation of the left lumbar erector spinae, upper gluteal region, and quadratus lumborum also recreated localized pain with significant tenderness to palpation. Palpation testing also revealed that the patient had significant muscle guarding and tightness of left erector spinae, paraspinals, and quadratus lumborum. Passive bilateral and left unilateral posterior-anterior accessory range of motion also recreated pain in lumbar spine and buttocks region. Passive intervertebral motion was determined to be 2/6 in left L3-S1 segments with slight joint limitations of movement. There was significant weakness of the lower abdominals and lumbar pelvic stabilizers, 2/5, with rapid fatigue and inability to maintain neutral spine position during supine manual muscle testing. Neurodynamic testing using a straight leg raise test caused local lumbar pain at 15 degrees of flexion of her left hip and at 30 degrees of flexion of her right hip. There was no increase or change in left lower extremity pain or symptoms. The localized lumbar pain was reported to be sharp and pulling. The pain descriptors reported during straight leg raise testing differed from previous pain reported and fit the descriptors of pain of a muscular
origin. However, neither increased peripheral pain symptoms in the left lower extremity and no change was noted with increasing dorsiflexion. Straight leg raise was determined to be negative due to no recreation of lower extremity pain and symptoms. This test has a sensitivity of 0.91 and specificity of 0.26 for lumbar disc herniation with a positive likelihood ratio of 1.2 and negative likelihood ratio of 3.5 (Deville et al., 2000). Neurological testing revealed no determinable myotomal weakness, sensory abnormalities, or abnormalities in deep tendon reflexes.

**Clinical Impression #2**

The patient described was likely to have intermittent nerve root compression with neurogenic claudication as a result of spinal stenosis. Left lumbar referred pain to the lower extremity due to irritation of the nerve root due to stenosis was suspected due to limitations in lumbar range of motion, preferred posture, and joint restrictions. Significant muscle guarding and tightness due to the motor vehicle accident is likely to further decrease inter-vertebral spacing and increase localized inflammation causing additional lumbar and referred pain symptoms. MRI impressions included: left L4-L5 spinal stenosis, L4-L5 facet arthropathy, disc bulges on L3-L5, and L4-L5 degenerative disc disease. These findings would further indicate potential irritation of the lower lumbar nerve roots with narrowing of the intervertebral disc space, bulging of the disc, and degeneration of the facet joint causing stenosis of the lateral intervertebral foramen. Due to the presence of lateral stenosis as well as movement limitations it was decided to initiate a plan of care including manual therapy spinal and soft
tissue mobilizations and therapeutic exercise to improve strength and
neuromuscular control within the lumbar spine to reduce pain, inflammation,
functional limitations, and level of disability. This is based on the clinical practice
guidelines for low back pain (Delitto). The patient’s response to intervention and
her associated outcomes were evaluated and recorded every 3 visits to
determine appropriateness of interventions and progress toward short and long
term goals (Table 1).
<table>
<thead>
<tr>
<th>Goal type and number</th>
<th>Goal description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term goal (STG) #1</td>
<td>Improve lateral flexion to 20 degrees, flexion to 50 degrees, and rotation to 25 degrees bilaterally to allow for improved ability to complete ADLs including household chores, self-care tasks, and work related activities within 3 weeks.</td>
</tr>
<tr>
<td>STG #2</td>
<td>Improve strength of transverse abdominis and lower abdominals to 4-5 to improve lumbar stabilization to allow for improved ability to transfer, bend, lift, carry, ambulate, stand, and sit for prolonged periods of time within 3 weeks.</td>
</tr>
<tr>
<td>STG #3</td>
<td>Patient will be able to sit for 15 minutes without increase of lumbar or radiating pain to improve ability to complete work tasks within 3 weeks.</td>
</tr>
<tr>
<td>Long term goal (LTG) #1</td>
<td>Improve lateral flexion to 30 degrees, flexion to 70 degrees, and rotation to 40 degrees bilaterally to allow for improved ability to complete ADLs including household chores, self-care tasks, and work related activities within 6 weeks.</td>
</tr>
<tr>
<td>LTG #2</td>
<td>Improve strength of transverse abdominis and lower abdominals to 5/5 to improve lumbar stabilization to allow for improved ability to transfer, bend, lift, carry, ambulate, stand, and sit for prolonged periods of time within 6 weeks.</td>
</tr>
<tr>
<td>LTG #3</td>
<td>Patient will be able to sit for 1 hour sessions without increase of lumbar or radiating pain to improve ability to complete work tasks within 6 weeks.</td>
</tr>
</tbody>
</table>
**Intervention**

At the initial treatment session, manual therapy techniques were utilized to address generalized lumbar hypomobility with emphasis on L4-L5 joint as passive intervertebral motion testing, palpation, and diagnostic imaging determined this segment displayed increased reactivity and left lateral stenosis. Various manual therapy techniques and lumbar pelvic stabilization exercises were completed (Table 2). After mobilization was completed, pain free lumbar rotation range of motion was retested during the same treatment session. Range of motion had improved and the patient reported decreased focal pain, tenderness to palpation, and centralization of radiating pain to left buttocks. Further education was given to the patient to reduce patient anxiety and to reduce strain through the lumbar spine causing exacerbation of symptoms.
<table>
<thead>
<tr>
<th>Intervention</th>
<th>Parameters</th>
<th>Position</th>
<th>Target structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maitland Grade II and Grade III left rotational</td>
<td>60 seconds, 30 movements/minute, 10 sets</td>
<td>Right side lying</td>
<td>L4-L5 spinal segment</td>
</tr>
<tr>
<td>mobilization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maitland Grade II and Grade III flexion mobilization</td>
<td>60 seconds, 30 movements/minute, 10 sets</td>
<td>Right side lying</td>
<td>L4-L5 spinal segment</td>
</tr>
<tr>
<td>Soft tissue mobilization</td>
<td>15 minutes</td>
<td>Seated in manual massage chair</td>
<td>Ercector spinae, thoracolumbar fascia, gluteus medius, gluteus minimus, and quadratus lumborum</td>
</tr>
<tr>
<td>Lumbar pelvic stabilization exercises</td>
<td>See Table 3</td>
<td>Hook lying</td>
<td>Transverse abdominis and neutral spine posture</td>
</tr>
<tr>
<td>Patient education regarding ergonomics and spine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3  
*Progression of lumbar pelvic stabilization exercises*

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Parameters</th>
<th>Position</th>
</tr>
</thead>
</table>
| Transverse abdominis (TA) activation with posterior pelvic tilt | 10 second isometric hold  
10 repetitions  
2 sets | Hook-lying                          |
| Alternating marching with TA activation          | 30 seconds  
2 sets | Hook-lying                          |
| Straight leg raise with TA activation            | 30 seconds  
2 sets per leg | Supine with non-moving leg in hook-lying |
| Side lying clam shell with TA activation         | 30 seconds  
2 sets per leg | Side lying with hips at 60 degrees  
and knees at 90 degrees |
| Side lying straight leg raise with TA activation | 30 seconds  
2 sets per leg | Side lying with legs extended |
| Standing hip abduction with TA activation        | 20 repetitions  
2 sets | Standing                          |
| Standing marching with TA activation             | 20 repetitions  
2 sets | Standing                          |

Patient response to initial plan of care was assessed and at the second physical therapy session, the patient reported reduced pain to 9/10 and improved motion and tolerance to activity. Patient reported that her radicular pain in left posterior lower extremity extended only to the popliteal fossa. The interventions (Table 2) were applied at this and each subsequent physical therapy visit with progression of conservative lumbar pelvic stabilization exercises (Table 3). With a reduction of muscle guarding the presence of directional preference was noted with a flexion directional preference with further reduction of pain. The patient had twelve total physical therapy visits following the aforementioned protocol.
Reassessment of pain and associated neurological signs were made at each visit to determine progress and appropriateness of selected interventions. Due to improvements of neurological signs and symptoms using conservative physical therapy management and manual therapy techniques, the referral of the patient to a neurosurgeon for surgical management was not considered necessary.

**Outcome**

After twelve visits after their initial physical therapy evaluation the patient reports their pain reduced to 5/10 levels and their lower extremity pain symptoms have resolved at rest and with all activities except prolonged upright sitting. There was also a significant centralization of pain with the most distal radiating pain being present to the buttock region. The patient’s tolerance for sitting improved with being able to sit upright for 30-minutes prior to increase of pain, and ability to sit in a reclined or forward flexed position for greater than 1-hour without increase of pain. The Revised Oswestry Disability Index (ODI) was completed again and the patient reported a score of 46% indicating reduced level and severity of disability resulting from current low back pain and dysfunction (Table 4). The patient also was able to return to previous work and household duties including those that required bending, carrying, lifting, and repetitive motions. The patient reported that she could once again sleep through the night and sleep on her left side without disruption due to low back or lower extremity referred pain. The patient displayed significantly improved ROM throughout the lumbar spine (Figure 1). The only remaining site of muscle guarding and tenderness to palpation was present at the left lower lumbar paraspinals.
Table 4

Progression of objective measures

<table>
<thead>
<tr>
<th></th>
<th>Initial Evaluation (left/right)</th>
<th>Visit #3 (left/right)</th>
<th>Visit #6 (left/right)</th>
<th>Visit #9 (left/right)</th>
<th>Final (left/right)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revised Oswestry Disability Index (ODI)</td>
<td>70%</td>
<td></td>
<td></td>
<td></td>
<td>46%</td>
</tr>
<tr>
<td>Pain level (NPS)</td>
<td>10/10</td>
<td>8/10</td>
<td>7/10</td>
<td>6/10</td>
<td>5/10</td>
</tr>
<tr>
<td>Most distal radiating pain</td>
<td>Mid-calf</td>
<td>Poiliteal fossa</td>
<td>Poiliteal fossa</td>
<td>Buttock</td>
<td>Buttock</td>
</tr>
<tr>
<td>Lumbar flexion</td>
<td>30°</td>
<td>40°</td>
<td>45°</td>
<td>52°</td>
<td>62°</td>
</tr>
<tr>
<td>Lumbar extension</td>
<td>10°</td>
<td>10°</td>
<td>10°</td>
<td>12°</td>
<td>15°</td>
</tr>
<tr>
<td>Lumbar lateral flexion</td>
<td>5°/10</td>
<td>8°/15°</td>
<td>10°/20°</td>
<td>16°/22°</td>
<td>20°/25°</td>
</tr>
<tr>
<td>Trunk rotation</td>
<td>15°/5°</td>
<td>20°/5°</td>
<td>25°/10°</td>
<td>32°/20°</td>
<td>35°/30°</td>
</tr>
</tbody>
</table>

Figure 1

Lumbar Range of Motion (ROM) throughout physical therapy
Discussion

Spinal stenosis, degenerative disc disease, and disc related pathologies can cause diminished space within the intervertebral foramen causing compression on the spinal nerve root or spinal ganglion. Localized pain as well as radiating pain into the lower extremity may present from compression, irritation, or pinching of the neural tissue as well as accompanied inflammation and chemical factors. This combination of factors can cause increased neural sensitization (Latremoliere & Wolf, 2009).

MRI and routine advanced imaging are not associated with improved patient outcomes and may demonstrate abnormalities that have a limited relationship to the patient’s symptoms. The patient’s MRI displayed disc bulging, however studies have shown that up to 81% of asymptomatic individuals will demonstrate bulging of intervertebral discs (Jarvik & Deyo, 2002). Within the case report patient’s age group, 80% of asymptomatic individuals will show signs of disc degeneration and 60% will show signs of disc bulging on MRI imaging (Brinjikji et al., 2014). Because of false positives as well as the costs of diagnostic imaging it is suggested to treat conservatively for 4 to 6 weeks prior to advanced diagnostic imaging should the symptoms be unable to be relieved (Lateef & Patel, 2009).

There are various prognostic factors that predict the outcome of lumbar spine disorders. The presence of radiating lower extremity pain is a poor prognostic factor, as is high intensity of pain (Schistad, 2013). Anxiety related to condition and pathology is also another poor prognostic factor that further
complicates the conservative treatment of lumbar spine disorders (Campbell, Foster, Thomas, & Dunn, 2013). This case study patient had radiating lower extremity pain that was severe in intensity combined with anxiety. A positive outcome with significant reduction of symptoms, functional limitations, and level of disability was demonstrated even with this combination of poor prognostic factors.

Placebo effect as well as natural spontaneous resolution of low back pain can influence reported pain intensity level (Puhl, Reinhart, Rok, & Injeyan, 2011). Further testing throughout the plan of care including manual muscle testing of lumbar pelvic stabilizers and lumbar range of motion was conducted in addition to pain reporting to demonstrate affects, beyond any placebo effect, on pain intensity level and outcomes. This additional testing was utilized to determine the effects of manual therapy and conservative treatment as well as the value of the specific techniques being utilized for this patient. Lumbar range of motion, reported pain level, and strength of the lumbar pelvic stabilizers all improved significantly with this case report patient throughout the plan of care.

The use of spinal mobilization has been shown through evidence-based research to decrease pain and disability associated with lumbar pain (Shum, Tsung, & Lee, 2013). There is a hypoalgesic effect of spinal mobilization due to stimulation of the dorsal root horn, descending pain pathway, or systemic release of neurotransmitters (Bialoskey et al., 2009; Potter, McCarthy, & Oldham, 2005). Manual therapy and spinal mobilization can be used to address hypomobility of a spinal segment and has been shown to improve the accessory mobility and
increase the mobility of the surrounding tissue to reduce compression on the sensitive neural tissue (Olson, 2015). The use of manual therapy techniques including flexion-distraction mobilization has shown to significantly increase disc height (Choi et al., 2014). Also, research concerning mechanotherapy indicates that movement of pathological structures cause increases of healing factors and allow for proper alignment and reorganization of tissue (Khan & Scott, 2009). It is possible that mobilizations of the L4-L5 segment served to move the mechanical interface around the affected nerves that would serve to reduce inflammation and compression surrounding these neural structures (Shacklock et al., 2005). This case patient displayed an improvement in lumbar range of motion as well as disability level and pain levels. Restriction of pain free range of motion in the direction of foraminal closing within the lumbar spine remained, however, the amount of range of motion restriction was greatly reduced.

Soft tissue mobilization has been shown to reduce focal points of pain due to increased muscle compliance, decreased stiffness, improved circulation, decreased neural excitability, changed parasympathetic activity, and promotion of systemic release of endorphins. It has also been shown to decrease anxiety that can also have a positive predictive effect on the patient’s pain level (Weerapong, Hume, Kolt, 2005).

Initially, due to the mechanism of injury and associated muscle guarding and strain, all motions of the lumbar spine were painful at end range of motion. However, after the acute period ended the patient then fit into the directional preference category with reduction of pain with flexion and opening of the left L4-
L5 spinal segment. There is strong evidence for the use of mobilization procedures in order to reduce pain and disability in patients who are experiencing subacute or chronic low back and back related lower extremity pain (Delitto et al., 2012). In addition to this there is evidence of centralization and reduction of symptoms with the use of repetitive directional preference movements to “improve mobility and reduce symptoms in patients with acute, subacute, or chronic low back pain with mobility deficits”. This patient largely fit into the “subacute low back pain with mobility deficits” ICF-based category. Because of the classification of the patient into this ICF-based category, the emphasis of treatment was to utilize manual therapy and therapeutic exercise to improve and maintain spinal, hip, and lumbopelvic mobility and preventing further episodes of pain therapeutic exercise for active stabilization and patient education (Delitto et al.).

The 11-point Numeric Pain Rating Scale (NPRS)(Appendix A-1) was utilized to track current pain levels of the patient. This survey has been studied and utilized in patients with low back pain. There is an associated Standard Error of Measurement (SEM) of 1.02. The Minimum Detectable Change (MDC) in cases of lower back pain is 2 points based on a 95% confidence interval. The Minimally Clinically Important Difference (MCID) at 4 weeks of physical therapy treatment of lower back pain is 2.2 points (Childs et al, 2005). The patient displayed a reduction of 5 points on the NPRS which is beyond the MDC and MCID indicating a significant positive change throughout the course of conservative physical therapy treatment in the severity of pain.
The Revised Oswestry Disability Index (ODI)(Appendix A-2) is a survey based on questions regarding the severity of low back pain and the functional limitations and disability associated with that pain. Studies have shown that the MDC of this survey is 15.35 in populations with sub-acute low back pain and a MCID is 9.5. The sensitivity of this survey is 76% and the specificity is 63% (Monticone et al, 2012). This test also has excellent test retest reliability and excellent correlation between improved vs nonimproved patients (Frost et al, 2008; Grotle et al, 2012). The patient displayed 24% reduction of the Revised Oswestry Disability Index score which is greater than the MDC and MCID indicating a significant positive change in level of disability related to low back pain and dysfunction.

It is suggested that lumbar stenosis and accompanying radiating pain be treated conservatively (Valat, Genevay, Marty, Rozenberg, & Koes, 2010). Additional research regarding the use of alternative manual therapy techniques in the treatment of lumbar stenosis and lumbar spine disorders as part of physical therapy treatment is indicated as these techniques utilized are only a small portion of the techniques available. Other techniques may demonstrate differing results in the outcomes of each individual patient. Although the results of this case report cannot be generalized, it does depict the successful outcomes of one patient using manual therapy techniques and therapeutic exercises as part of a conservative physical therapy treatment. The treatment plan implemented addressed severe lumbar spine pain and radiating lower extremity pain and related functional limitations with positive outcomes including: centralized
radiating pain, reduction of low back pain, reduction of physical disability, improved pain free range of motion, resolution of various physical limitations, and return to prior level of function.
References


Appendix A: Numeric Pain Rating Scale
Appendix B: Revised Oswestry Disability Index

Revised Oswestry Disability Index

This questionnaire has been designed to give the doctor information as to how your back pain has affected your ability to manage everyday life. Please answer every section and mark in each section only the ONE box that applies to you. We realize that you may consider that two of the statements in any one section relate to you, but please just mark the box that most closely describes your problem.

Section 1: Pain Intensity
- The pain comes and goes and is very mild.
- The pain is mild and does not vary much.
- The pain comes and goes and is moderate.
- The pain is moderate and does not vary much.
- The pain comes and goes and is very severe.
- The pain is severe and does not vary much.

Section 2: Personal Care
- I would not have to change my way of washing or dressing in order to avoid pain.
- I do not normally change my way of washing or dressing even though it causes some pain.
- Washing and dressing increases the pain, but I manage not to change my way of doing it.
- Washing and dressing increases the pain and I find it necessary to change my way of doing it.
- Because of the pain, I am unable to do some washing and dressing without help.
- Because of the pain, I am unable to do any washing and dressing without help.

Section 3: Lifting
- I can lift heavy weights without extra pain.
- I can lift heavy weights, but it causes extra pain.
- Pain prevents me from lifting heavy weights off the floor, but I manage if they are conveniently positioned (e.g., on a table).
- Pain prevents me from lifting heavy weights off the floor.
- Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.
- I can only lift very light weights at the most.

Section 4: Walking*
- I have no pain on walking.
- I have some pain on walking, but it does not increase with distance.
- I cannot walk more than one mile without increasing pain.
- I cannot walk more than 1/2 mile without increasing pain.
- I cannot walk more than 1/4 mile without increasing pain.
- I cannot walk at all without increasing pain.

Section 5: Sitting
- I can sit in any chair as long as I like.
- I can only sit in my favorite chair as long as I like.
- Pain prevents me from sitting more than one hour.
- Pain prevents me from sitting more than 1/2 hour.
- Pain prevents me from sitting more 10 minutes.
- I avoid sitting because it increases pain right away.
Appendix B: Revised Oswestry Disability Index (continued)

Section 6: Standing
- I can stand as long as I want without pain.
- I have some pain on standing, but it does not increase with time.
- I cannot stand for longer than one hour without increasing pain.
- I cannot stand for longer than 1/2 hour without increasing pain.
- I cannot stand for longer than 10 minutes without increasing pain.
- I avoid standing because it increases the pain right away.

Section 7: Sleeping
- I get no pain in bed.
- I get pain in bed, but it does not prevent me from sleeping well.
- Because of pain, my normal night’s sleep is reduced by less than 1/4.
- Because of pain, my normal night’s sleep is reduced by less than 1/2.
- Because of pain, my normal night’s sleep is reduced by less than 3/4.
- Pain prevents me from sleeping at all.

Section 8: Social Life
- My social life is normal and gives me no pain.
- My social life is normal, but increases the degree of pain.
- Pain has no significant effect on my social life apart from limiting my more energetic interests, e.g., dancing, etc.
- Pain has restricted my social life and I do not go out very often.
- Pain has restricted my social life to my home.
- I have hardly any social life because of the pain.

Section 9: Traveling
- I get no pain while travelling.
- I get some pain while travelling, but none of my usual forms of travel makes it any worse.
- I get extra pain while travelling, but it does not compel me to seek alternative forms of travel.
- I get extra pain while travelling, which compels me to seek alternative forms of travel.
- Pain restricts all forms of travel.
- Pain prevents all forms of travel except that done lying down.

Section 10: Changing Degree of Pain
- My pain is rapidly getting better.
- My pain fluctuates, but is definitively getting better.
- My pain seems to be getting better, but improvement is slow at present.
- My pain is neither getting better nor worse.
- My pain is gradually worsening.
- My pain is rapidly worsening.