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# Physical Therapy Rehabilitation for Lumbar Radiculopathy: A Case Report

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PHYSICAL THERAPY REHABILITATION FOR LUMBAR RADICULOPATHY  
A CASE REPORT

by

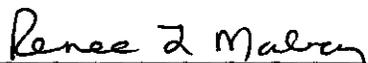
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A Scholarly Project Submitted to the Graduate Faculty of the  
Department of Physical Therapy  
School of Medicine  
University of North Dakota

in partial fulfillment of the requirements for the degree of

Doctor of Physical Therapy  
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This Scholarly Project, submitted by Rebecca Lynch in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

  
(Graduate School Advisor)

  
(Chairperson, Physical Therapy)

PERMISSION

**Title** Physical Therapy Rehabilitation for Lumbar Radiculopathy  
A Case Report

**Department** Physical Therapy

**Degree** Doctor of Physical Therapy

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## ABSTRACT

**Background and Purpose.** Lumbar radiculopathy is one of the most common orthopedic conditions. This occurs when there is damage to a nerve root in the area that it exits the spinal cord. This can be caused from a disc herniation, bone spurs, trauma, or a mechanical stretching event. There is not consistent evidence in current literature regarding rehabilitation interventions for this condition.

**Case Description.** This case report describes a 62-year-old female presenting to physical therapy with lumbar radiculopathy symptoms. She had multiple comorbidities as well as a scheduled total knee replacement surgery. Physical therapy interventions for this patient included manual therapy, therapeutic exercise, and patient education.

**Outcomes.** The patient responded well to treatment and significantly improved following two weeks of physical therapy rehabilitation. She reported minimal pain that was centralized to the low back. She demonstrated an increase in lumbar range of motion, strength, and mobility.

**Discussion.** This patient demonstrated a significant improvement in a short period of time. This case report may suggest intervention strategies for future research regarding physical therapy and lumbar radiculopathy.

## CHAPTER I

### BACKGROUND AND PURPOSE

Lumbar radiculopathy is caused when a nerve root is injured in the area where it exits the spinal cord. The pain that radiates from the lumbar spine down into the lower extremities along the damaged nerve is called sciatica. Along with pain, there are other symptoms that may be present including numbness, tingling, weakness and muscle spasms in the lower extremities. This diagnosis can be the result of several different structural problems at the spine. These problems include a disc herniation, a bone spur, trauma, or a mechanical stretching event. The damage to the disc can be caused from a certain activity, an injury, or can possibly be congenital. This nerve damage occurs when the substance located in the center of a disc escapes the outer protective ring and puts pressure on a nerve root. MRIs, CT scans, and electrodiagnosis can help determine if the radiculopathy is disc related. Treatment options can include physical therapy, medication, steroid injections, back supports, and surgery. The common age when symptoms start to appear is between 30-50 years. Prognosis for lumbar radiculopathy is normally good.<sup>14</sup>

There are several discussions in literature on theories regarding the best treatment for lumbar radiculopathy. One issue being discussed is whether conservative or surgical treatment is a better option for these patients. Some suggest that early surgical treatment is the best for a faster recovery.<sup>4</sup> However, surgery is expensive and comes with possible complications. Others have found there to be no difference between surgery and conservative care when comparing clinical outcomes after one year.<sup>12</sup>

Manual therapy is often used with low back pain and lumbar radiculopathy. A well-designed cohort study discussed the effectiveness of neural manual therapy interventions with patients experiencing low back and leg pain. The goal of these passive techniques was to mobilize the neural structures in the intervertebral foramen. This mobilization gradually desensitizes the peripheral nervous system. The majority of the subjects in the study responded favorably to this intervention.<sup>20</sup> Another study based on the conclusions from several systematic reviews and randomized clinical trials looked at the effectiveness of manual therapy for the treatment of several musculoskeletal conditions including sciatica and radiating leg pain. Conclusions from this study also discussed that there is a favorable level of evidence for spinal manipulation and mobilization for sciatica and radiating leg pain. The “favorable” level of evidence in this study means that the evidence does not support effectiveness but if other treatments are not effective, this intervention may be a treatment option.<sup>2</sup>

The McKenzie protocol based on directional preference is another intervention technique that is used with this condition. A systematic review was done studying the use of the McKenzie therapy protocol for spinal pain. The authors concluded that the McKenzie method reduces short-term pain and disability in people suffering from low back pain over other standard treatments. However, there was insufficient evidence on long-term outcomes.<sup>5</sup> Another systematic review studying McKenzie Therapy outcomes for back pain was done that determined similar results. The review compared McKenzie directional preference exercises to other standard treatments including back massage, strength training, and spinal mobilizations. They found that the patients who followed the McKenzie approach had better outcomes with decreased pain and disability.

This systematic review also concluded that the evidence was not strong enough to show long-term outcomes after a year with McKenzie therapy on pain or disability.<sup>3</sup>

Lumbar Radiculopathy can often present similarly to piriformis syndrome. Some similarities include pain with sitting for long periods of time, relief when standing or walking, and pain in the buttock area. A patient with piriformis syndrome will often report trauma to the buttock area or bowel and bladder changes during the subjective history. During the assessment, there is often tenderness over the piriformis muscle, a mass in the buttock, and relief when a traction force is applied to the leg. These findings are not commonly seen in a patient with lumbar radiculopathy. It is important to complete a full neurological assessment in order to correctly diagnose.<sup>1</sup> The FAIR test including flexion, adduction, and internal rotation is often performed to indicate piriformis syndrome. This test has a specificity of 83.2%.<sup>11</sup>

Trochanteric bursitis can also mimic radiculopathy. Both diagnoses can cause pain on the outside of the hip or in the buttock area. With trochanteric bursitis, there is commonly pain with pressure on the outside of the hip and the pain gets worse with activities including sit-to-stand and walking up stairs. The pain can be caused from injury to the hip, bone spurs, calcium deposits, and overuse activities including running, walking up stairs, and standing for long periods of time.<sup>22</sup>

Lumbar radiculopathy is one of the most common orthopedic conditions, and there are controversies over the best intervention strategies. More research is needed to provide the best care to patients with this condition. The purpose of this case report was to document the fast recovery of a patient experiencing lumbar radiculopathy in physical therapy rehabilitation. This may be a favorable group of interventions to guide future research regarding physical therapy and lumbar radiculopathy.

## CHAPTER II

### CASE DESCRIPTION

This case study focuses on a 62 year-old female who was referred to physical therapy with the diagnosis of piriformis syndrome. She had been experiencing left buttock pain for the past 3 to 4 months upon arrival to therapy. The patient did not recall any specific incident or trauma that lead to the onset of these symptoms. She denied low back pain and symptoms such as numbness or tingling down into her lower extremities. She reported that her symptoms increased when she was sitting, and were relieved when she was standing or walking. The patient lives with her husband in a two-story house. She is employed as a high school receptionist and sits for approximately 80% of her workday. She described that her symptoms interfered with her ability to sit for long periods of time at her desk and complete her work. In her free time, she enjoys spending time with her children and grandchildren. She often takes care of her grandchildren in the evenings. She reported having difficulty picking up her grandchildren off the floor and playing with them due to her recent symptoms. Secondary to her buttock symptoms, the patient explained that she was having a total knee replacement in two weeks due to degenerative joint disease in her left knee. She stated that her knee is painful during ambulation and when she is weight bearing on her left side. After her surgeon had suggested losing some weight prior to surgery, she started watching her diet more closely but was not exercising. During the systems review, she denied any constant pain, night pain, abdominal pain, recent illnesses, or cauda equina symptoms. Her past medical history included asthma, obesity, and type 2 diabetes. The patient reported that she monitors her asthma and diabetes closely and

has not had health related issues due to these comorbidities. The patient's goals were to be able to take care of her grandchildren and work a full day without symptoms.

My clinical impression for this patient was that she was appropriate for physical therapy. No systemic signs or symptoms were present during the subjective history taking. The subjective history suggested a movement dysfunction, which is in the physical therapy scope of practice. The examination plan included the assessment of her range of motion, strength, mobility, and gait. These assessments along with palpation and special tests were performed to rule in or out other diagnoses including lumbar radiculopathy, piriformis syndrome, and trochanteric bursitis. Prognostic factors that could have affected her recovery included her comorbidities, family support, and scheduled total knee replacement surgery.

### **Examination**

Examination was based on Magee's Orthopedic Physical Assessment of the lumbar spine.<sup>15</sup> The patient filled out a Modified Oswestry Disability Index before the physical therapy evaluation. This questionnaire gives a subjective score that rates her level of disability in activities due to low back pain. She scored a 14% on a 0-100% scale, 0% being the best with no restriction in function. X-ray imaging was included with the physician's referral note that showed extensive osteoarthritis in the left knee. Upon observation, poor posture with a forward head and rounded shoulders was documented. The patient had a slight antalgic gait pattern with a decreased period of time in the stance phase with the left lower extremity. All directions of the lumbar spine active range of motion were full and pain-free with the exception of flexion. Her lumbar flexion range of motion was limited and also reproduced her symptoms in the left buttock. She also reported feeling tightness in the left low back with this motion. Table 3

documents her lumbar spine range of motion measurements at the initial evaluation and at discharge.

During palpation, she had marked tenderness and hypermobility over her lower lumbar vertebrae and over her left sacral base. She had palpable tightness over her left lumbar paraspinal muscles. When the piriformis muscle was palpated, she did not report any discomfort. This area is often painful with pressure for a patient with piriformis syndrome.<sup>1</sup> Palpation over the greater trochanter also did not reproduce symptoms, which is commonly a finding in patients with trochanteric bursitis.<sup>22</sup> Active and passive hip range of motion was within normal limits bilaterally. She had 5/5 hip strength except for hip abduction, which was documented as 4/5. The right lower extremity was within normal limits for strength and range of motion. The left knee had 5/5 strength but was painful with strength testing. Passive and active range of motion of left knee flexion was limited to 120 degrees secondary to pain. Crepitus was felt over both knees during passive range of motion. The patient had no increase in muscle tone. Dermatome testing was negative bilaterally. The Slump Test was performed to determine if the patient had nerve root involvement. First, the patient sat in her natural posture and denied any symptoms. Then, when she was asked to slouch, she reported having symptoms in the left buttock. The Straight Leg Raise was a second special test performed to also determine if she had neural tissue involvement. This test is often positive in patients with sciatica and is often negative in patients with spinal stenosis.<sup>16</sup> The patient laid on her back and each leg was passively flexed off the table with her knee extended. When her left leg reached 50 degrees, she experienced a reproduction of her pain in the left buttock. Her left leg was then passively lowered 10 degrees, which eliminated her symptoms. Finally, her left foot was passively dorsiflexed, which reproduced her symptoms. Tables 1 below documents the sensitivity, specificity, and reliability

of the special tests performed during this examination. Table 2 below documents the Oswestry Disability Index functional assessment rehabilitation measures.

**Table 1.** Sensitivity, Specificity, and Reliability of the Special Tests

Test	Sensitivity	Specificity	Interrater Reliability
Straight Leg Raise	0.92 <sup>18</sup>	0.28 <sup>18</sup>	0.73 <sup>7</sup>
Slump Test	1.0 <sup>21</sup>	0.83 <sup>21</sup>	0.89 <sup>17</sup>

**Table 2.** Oswestry Disability Index – Rehabilitation Measures

MCID	Test/Retest Reliability	Criterion Validity	MDC
12.8 <sup>6</sup>	0.94 <sup>10</sup>	0.75 <sup>8</sup>	11.1 <sup>10</sup>

### Evaluation, Diagnosis, and Prognosis

The initial evaluation indicated that her symptoms were coming from her low back and referring down to her left buttock. It is possible that she had a disc pathology that was causing the nerve root compression. The positive special tests, her tender and hypomobile lumbar vertebrae, and her tight left lumbar paraspinal muscles support this hypothesis along with the fact that her symptoms increased when she was sitting and were relieved when she was standing or walking. The piriformis muscle itself was not painful and did not reproduce her radicular symptoms during palpation. This finding, along with the positive slump test, helped to rule out the diagnosis of piriformis syndrome. Trochanteric bursitis was also ruled out as a diagnosis because she did not report tenderness when lying on the affected side or with palpation over the greater trochanter.

The primary rehabilitation goal created with the patient was to return to her prior level of function, which included working at her receptionist job and taking care of her grandchildren without symptoms. The short-term goals were to decrease her pain and for her to demonstrate independence with her home program. These goals were to be met within a one to two week time frame. The long-term goals were to increase lumbar spine range of motion, strength, and mobility. These goals were to be met within a four to six week time frame after taking her possible barriers into consideration.

Following the initial evaluation, I determined that her prognosis to reach these goals was “fair”. She had a goal-oriented and motivated personality. This suggested that she would be compliant with her home program. She had a strong support system from her husband and children both at the clinic and at home. Although the prognosis of patients experiencing lumbar radiculopathy is normally good, her several comorbidities, sitting desk job, and scheduled knee surgery were barriers that could hinder her progress and prognosis. My initial clinical impression was confirmed after the examination, as I concluded this patient would benefit from physical therapy interventions so she could return to her prior activities without limitations. There were no findings that suggested this patient should be referred to another medical provider. If the patient did not progress after two physical therapy treatments, I could re-examine and evaluate as I could have missed something or refer if needed.

### CHAPTER III

#### INTERVENTION

The patient was seen in physical therapy twice a week for 30-minute sessions. Interventions included manual therapy and therapeutic exercise. A home exercise program was given to the patient after demonstration and practice of each of the exercises in the clinic to ensure that she understood them. Treatment remained fairly consistent as she was responding well and was continually less symptomatic after every session. The patient was very compliant to her home exercise program. Her husband was involved in the therapy sessions both in the clinic and at home.

Manual therapy was performed on her lumbar spine at every visit. Central and left posterior-anterior grade 3 mobilizations were applied to lumbar levels of L2 to L5 and at the left sacral base to promote mobility. Another manual technique used was left lumbar rotation oscillations performed at a grade 3 while patient was in a right side-lying position to open up the intervertebral foramen and relieve pressure off the nerve roots. The patient responded well to this treatment.

Therapeutic exercise was provided to help strengthen, promote mobility, and increase her range of motion in the low back. These exercises included standing back extensions, pelvic tilts, straight leg raises, and supine bridging. Side-lying hip abductor strengthening was another exercise given to address her limited hip abductor strength. The patient was instructed to perform 1 set of 10 repetitions of each exercise 2-3 times a day. However, we discussed that performing

10 repetitions of the standing back extensions every 2 hours would be beneficial.<sup>9</sup> No equipment was utilized with her exercises.

Education was given to the patient and family at every therapy session. After the initial evaluation the patient was educated on her condition. She was also advised to avoid sitting for long periods of time. We discussed looking into a standing workstation at the school, as this would take pressure off her aggravated nerve roots. She was informed to apply ice to the low back to decrease inflammation and assist with pain when needed.

Since we were the only medical professionals working with her for the radicular symptoms, communication with other disciplines was not necessary. After two weeks of treatment, the patient had a total knee replacement surgery and came to physical therapy for her post surgical rehabilitation. She was no longer receiving physical therapy for her low back at this time.

## CHAPTER IV

### OUTCOMES

This patient made consistent and significant improvement in a two-week time frame. Her symptoms had centralized to the low back and were less intense and less frequent. Education was given to the patient regarding centralization and how this was a positive symptom. Her lumbar spine range of motion was measured after two weeks of treatment and was compared to her initial measurements. This is documented below in Table 3.

**Table 3.** Initial and Discharge Lumbar Spine Active Range of Motion Measurements (In Degrees)

Direction	Initial	Discharge
Flexion	50	60
Extension	40	40
Side Bend Left	30	30
Side Bend Right	30	30
Left Rotation	30	30
Right Rotation	30	30

During lumbar flexion, she reported feeling less stiff and denied any radicular symptoms into her left buttock. When manual therapy was performed on the patient's lumbar spine during the last

physical therapy session for her back, her lumbar vertebrae had increased mobility. The patient's hip abductor strength increased from a 4/5 to 4+/5.

After these two weeks, the patient underwent a total knee replacement surgery. She returned to therapy following this, but was then receiving therapy for her knee rehabilitation only. Secondary to not being able to walk and perform her exercises as frequently, her back symptoms became slightly worse. As she made progress with her knee rehabilitation and was able to become more active again, her back symptoms resolve. My clinical rotation at this site ended before the patient was discharged for her knee. The patient and her family were very satisfied with her progress and reported that they were going to strive to live a more active lifestyle.

## CHAPTER V

### DISCUSSION

This patient had a significantly fast recovery over two weeks and was able to return to work and take care of her grandchildren without limitations. Some aspects that promoted her fast recovery included finding the source of her symptoms, her compliancy to her home program and positive attitude, and her family support. An aspect that hindered her recovery was having knee surgery shortly after presenting to physical therapy for her radicular symptoms.

A detailed subjective history taking and examination techniques including palpation, lumbar special tests, and ROM assisted with identifying the source of her symptoms. The Oswestry Disability Index functional assessment was useful when deciding on what level the patient was at functionally with her symptoms. Constant communication with the patient and family helped provide a positive atmosphere and helped gain trust from the patient.

The examination process helped to rule out other pathologies including piriformis syndrome and trochanteric bursitis. There was no trauma to the buttock area, no tenderness over the piriformis muscle, and no mass in the buttock, which are common findings in patients with piriformis syndrome.<sup>1</sup> Common findings in patients with trochanteric bursitis that were not present with this patient included pain over the greater trochanter and increased pain with sit-to-stand motions and walking up the stairs. Trochanteric bursitis can be caused from injury and overuse activities including running, walking up stairs, and standing for long periods of time.<sup>22</sup> There were no signs of these causes during the subjective history-taking portion of the evaluation.

The interventions chosen for this patient addressed predominantly strengthening, mobility, and patient education. In the systematic review discussed in the introduction regarding McKenzie directional preference exercises for patients with spinal pain, the evidence showed that patients had reduced short-term pain and disability.<sup>5</sup> My patient also demonstrated these positive outcomes. Manual therapy was performed at every treatment in the side-lying position to open up the intervertebral foramen and relieve pressure off of the neural structures. This technique was used in a study discussed above that studied the effectiveness of spinal manipulation and mobilization for sciatica or radiating leg pain. The patients in this study responded favorably to the manual therapy, as did my patient.<sup>2</sup> Education to the patient on how she can make adjustments at work was important since she spends a large amount of time there during the week.

The prognosis documented in the initial evaluation note was fair due to her age, occupation, scheduled knee surgery, and comorbidities including obesity and diabetes mellitus. She almost completely recovered in two weeks, which was unexpected. At this time, I would change her prognosis to good if she keeps up with the provided exercises and recommendations. Lifestyle changes including exercising more often and monitoring her diabetes carefully would take additional pressure off her spine and help to continue with recovery.

### **Reflective Practice**

My clinical instructor and I were very satisfied with our patient's fast recovery and with the interventions chosen. The correct examination tests were completed and quality subjective questions were asked in order to determine where her symptoms were coming from. This patient was seen by the same therapist for both her back symptoms and her knee rehabilitation. This was a benefit, as the patient could ask questions regarding her back during treatment for her knee.

There are some changes I would make in my evaluation process and plan of care for this patient. The subjective history taking could have been more extensive. More questions could have been asked on her current medical history, on her current living situation, and more on her personal goals and activities that she wanted to return to. Providing more postural education and core strengthening exercises would have been beneficial to this patient to help prevent future lumbar radiculopathy symptoms after discharge. Educating the patient on proper body mechanics, especially when bending down to lift her grandchildren, should have been addressed. During examination, additional testing on the hip should have been performed to rule out pathologies from this joint that could be causing symptoms. For example, the FAIR test would have been beneficial as this is usually positive in patients with piriformis syndrome.<sup>11</sup> Myotome and reflex testing could have also been performed to further test the neurological system. Gait training was only performed after the patient's total knee replacement surgery, which should have been incorporated in her plan of care previously. More extensive research regarding therapeutic exercises that are beneficial for lumbar radiculopathy should have been done before treating this individual.

I learned from this client that therapists need to look at the body as a whole to determine where the problem is coming from. It is important to do a thorough evaluation even when given a diagnosis from a physician.

## **Conclusion**

The patient presenting with lumbar radiculopathy had a significantly fast recovery following physical therapy rehabilitation. The interventions that were used included manual therapy, therapeutic exercise, and patient education. The patient had minimal symptoms after

two weeks and her pain had centralized to the low back. This case report may suggest intervention strategies for future research regarding physical therapy and lumbar radiculopathy.

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## APPENDIX

Oswestry Low Back Disability Questionnaire

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### Oswestry Low Back Pain Disability Questionnaire

#### Instructions

This questionnaire has been designed to give us information as to how your back or leg pain is affecting your ability to manage in everyday life. Please answer by checking ONE box in each section for the statement which best applies to you. We realise you may consider that two or more statements in any one section apply but please just shade out the spot that indicates the statement which most clearly describes your problem.

#### Section 1 – Pain intensity

- I have no pain at the moment
- The pain is very mild at the moment
- The pain is moderate at the moment
- The pain is fairly severe at the moment
- The pain is very severe at the moment
- The pain is the worst imaginable at the moment

#### Section 2 – Personal care (washing, dressing etc)

- I can look after myself normally without causing extra pain
- I can look after myself normally but it causes extra pain
- It is painful to look after myself and I am slow and careful
- I need some help but manage most of my personal care
- I need help every day in most aspects of self-care
- I do not get dressed, I wash with difficulty and stay in bed

#### Section 3 – Lifting

- I can lift heavy weights without extra pain
- I can lift heavy weights but it gives extra pain
- Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently placed eg. on a table
- Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned
- I can lift very light weights
- I cannot lift or carry anything at all

#### Section 4 – Walking\*

- Pain does not prevent me walking any distance
- Pain prevents me from walking more than 1 mile
- Pain prevents me from walking more than 1/2 mile
- Pain prevents me from walking more than 100 yards
- I can only walk using a stick or crutches
- I am in bed most of the time

**Section 5 – Sitting**

- I can sit in any chair as long as I like
- I can only sit in my favourite chair as long as I like
- Pain prevents me sitting more than one hour
- Pain prevents me from sitting more than 30 minutes
- Pain prevents me from sitting more than 10 minutes
- Pain prevents me from sitting at all

**Section 6 – Standing**

- I can stand as long as I want without extra pain
- I can stand as long as I want but it gives me extra pain
- Pain prevents me from standing for more than 1 hour
- Pain prevents me from standing for more than 30 minutes
- Pain prevents me from standing for more than 10 minutes
- Pain prevents me from standing at all

**Section 7 – Sleeping**

- My sleep is never disturbed by pain
- My sleep is occasionally disturbed by pain
- Because of pain I have less than 6 hours sleep
- Because of pain I have less than 4 hours sleep
- Because of pain I have less than 2 hours sleep
- Pain prevents me from sleeping at all

**Section 8 – Sex life (if applicable)**

- My sex life is normal and causes no extra pain
- My sex life is normal but causes some extra pain
- My sex life is nearly normal but is very painful
- My sex life is severely restricted by pain
- My sex life is nearly absent because of pain
- Pain prevents any sex life at all

**Section 9 – Social life**

- My social life is normal and gives me no extra 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 eg. sport
- Pain has restricted my social life and I do not go out as often
- Pain has restricted my social life to my home
- I have no social life because of pain

**Section 10 – Travelling**

- I can travel anywhere without pain
- I can travel anywhere but it gives me extra pain
- Pain is bad but I manage journeys over two hours
- Pain restricts me to journeys of less than one hour
- Pain restricts me to short necessary journeys under 30 minutes
- Pain prevents me from travelling except to receive treatment