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## Outpatient Physical Therapy Management of Patient with Severe Lumbar Derangement including Relevant Lateral Shift and Radiculopathy

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Outpatient Physical Therapy Management of Patient with Severe Lumbar Derangement  
including Relevant Lateral Shift and Radiculopathy

by

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A Scholarly Project Submitted to the Graduate Faculty of the

Department of Physical Therapy

School of Medicine

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in partial fulfillment of the requirements for the degree of

Doctor of Physical Therapy

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This Scholarly Project, submitted by Brita R Karolus 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.



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(Graduate School Advisor)



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(Chairperson, Physical Therapy)

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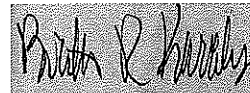
**Title** Outpatient Physical Therapy Management of Patient with Severe  
Lumbar Derangement including Relevant Lateral Shift and  
Radiculopathy

**Department** Physical Therapy

**Degree** Doctor of Physical Therapy

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## ABSTRACT

**Background and Purpose.** This case describes the 5 week outpatient Physical Therapy management of a 65 year old male with a lumbar radiculopathy and a relevant lateral shift. The patient presented with decreased lumbar range of motion, left sided paresthesia, an antalgic gait and severe pain. The purpose of this article is to describe the interventions used for this patient and the results of the interventions. **Description.** The interventions for this patient included McKenzie techniques as well as some manual techniques. **Outcomes.** Following the PT intervention, the patient achieved almost full active range of motion, good to normal strength, decreased pain, and a normal gait pattern. **Discussion.** The treatment of this patient was based primarily on Robin McKenzie's approach to treatment of the spine as well as treating the patient's presenting symptoms, including decreased range of motion and pain. Treatment was altered and/or progressed based on the patient's response.

**Key words:** lumbar derangement, sciatica, lumbar radiculopathy, disc bulge, disc herniation, low back pain



## CHAPTER I

### BACKGROUND AND PURPOSE

Low back pain is a common complaint among all groups of people, regardless of their socioeconomic status, gender, or age. It is described as the number one cause of disability globally.<sup>1</sup> The exact cause of the low back pain is hard to differentiate, and there are many different causes. Several pathologies including fracture, stenosis, spondylolysis, and disc herniation can all be causes of low back pain.

Primary care for the treatment of low back pain is moving away from routine imaging, and focusing more on taking a thorough history and physical examination to note any red flags, such as night pain, peripheralization, saddle anesthesia, bowel/bladder changes, or radicular symptoms. It is widely accepted that bed rest is not the recommended form of treatment of low back pain. NSAIDs, such as ibuprofen and Aleve are common medications prescribed by primary care providers for the treatment of both acute and chronic low back pain (93%).<sup>2</sup> The *Clinical Practice Guidelines for the Management of Non-Specific Low Back Pain in Primary Care* in the European Spine Journal found that 13 out of 15 (87%) reviewed guidelines showed the use of opioids in treatment for low back pain, with 61% prescribing to acute onset low back pain, and 38% to chronic low back pain.<sup>2</sup> A prescription of paracetamol/ acetaminophen was

supported in 57% of guidelines, antidepressants in 80% of guidelines, and muscle relaxants were prescribed and supported in 54% of cases.<sup>2</sup>

It is important to note that multidisciplinary rehabilitation was a recommended treatment in 90% of guidelines for chronic low back pain, with an additional guideline recommending this approach for any duration of symptoms, and another guideline recommending the multidisciplinary approach if there is no improvement after a monodisciplinary approach.<sup>2</sup> Most important to note for Physical Therapists, is the fact that all interventional guidelines examined in this Clinical Practice Guideline recommended exercise therapy for patients with low back pain. There was, however, a discrepancy in the type of exercise program and the duration.

A common treatment approach to lumbar disc herniation specifically is that of Robin McKenzie. His approach, also known as Mechanical Diagnosis and Therapy, or MDT, classifies patients with low back pain into 3 distinct categories, which helps to direct the treatment: derangement, dysfunction, or postural syndrome. Derangement, the most common category, includes patients who present with a rapid change in their symptoms due to a directional preference and specific mechanism of injury.

Derangements were reported in one study to be prevalent in 78% of patients treated with the McKenzie method.<sup>3</sup> This can be defined as “the direction in which a repeated movement and/or sustained position produces an improvement in symptoms.”<sup>4</sup>

Improvements usually include centralization, which occurs when symptoms down the lower extremity move in a distal to proximal direction, first to the spine and then to the disc until they are completely resolved.

Those patients who achieved centralization throughout their treatment showed a strong correlation with good to excellent overall outcomes, including a greater reduction in pain intensity, higher return to work rates, increased functional improvement, and an overall decrease in continued use of healthcare resources for low back pain.<sup>3</sup> Additionally, the McKenzie approach to treatment has shown a greater short term decrease in low back pain and the correlating functional disabilities as compared to other common treatments used for low back pain such as back and core stabilization.<sup>5,6</sup>

In addition to centralization, there is also the phenomenon of directional preference. Although related to centralization, it is a separate finding. Directional preference can be defined as the repeated movement that induces centralization, but also brings about a decrease in symptom severity and a positive mechanical response.<sup>7</sup> A common positive finding of directional preference is an increase in range of motion following repeated motions, and repeated motions in the opposite direction may cause symptoms to worsen. A finding of directional preference at baseline has been shown to predict a significantly better response to exercises targeting that preference than non-specific exercises.<sup>7</sup> To date, there is little research regarding directional preference, but it may be a possible treatment effect modifier. More data is currently present on the role of centralization.

Acute low back pain is described as back pain lasting for less than 12 weeks. There is moderate to high quality evidence that the McKenzie method to treatment is not superior to other interventions for reducing acute low back pain and disability in patients suffering from acute onset back pain.<sup>4</sup> Other interventions included joint mobilizations, manipulations, and range of motion exercises of the lumbar spine. First

line care, which consisted of the advice to remain active and take acetaminophen, as well as the reassurance of a favorable prognosis was also studied.<sup>8</sup>

Chronic low back pain, determined by pain lasting for greater than or equal to 12 weeks, favored the use of MDT for treatment for the reduction of pain, and disability.<sup>4</sup> Specifically, MDT was shown to be statistically significant in its ability to decrease disability of patients with low back pain as compared to treatment using a group Back School treatment.<sup>6</sup> In this study, Back School was a group based treatment approach with the goal of managing the current episode of low back pain, and preventing recurrence of symptoms. Exercises focused on improving flexibility, mobility and strength.<sup>6</sup> The disability outcome was measured using the 24 item Roland Morris Disability Questionnaire.

At a 1 year follow-up, a study by Paatelma M. et al<sup>4</sup> showed that the McKenzie method group had a better disability score than the advice-only group, while in comparison to the manual therapy group, there were no statistically different results in pain and disability scores at any of the 3-, 6-, or 12- month follow-up appointments.

In addition, patients with chronic low back pain who showed a directional preference were treated over 8 weeks with either the McKenzie method or using motor control exercises. The goal of the study was to determine the effects of both of these treatments in the muscle recruitment and size of the trunk muscles, in addition to pain, function, and global perceived effect.<sup>9</sup> No significant effect in the size of the transverse abdominis, internal oblique, or external oblique muscle groups was found between the 2 treatment groups. Those in the McKenzie group did report a slightly greater perceived recovery than those who were given the motor control exercises.<sup>9</sup>

It has also been shown that therapists who provide care to patients with chronic low back pain, and are trained in MDT have better treatment outcomes when compared to untrained therapists.<sup>2</sup> At this time, moderate to high quality evidence exists to prove that MDT is superior to other rehabilitation interventions for reducing pain and disability, although many studies comparing other interventions have small effect sizes.<sup>3</sup> It is important through treatment of all low back pain cases to take into consideration the patient's presenting symptoms as well as their values and preferences to treatment approaches. This will result in the best outcomes and prognosis for patients with both chronic and acute low back pain.

## CHAPTER II

### CASE DESCRIPTION

The patient is a 65-year-old male with left sided low back pain that radiates to the left lateral hip. He states that last week he had tingling in his left toes, but today he has no complaints of numbness or tingling. The patient states that his left sided low back pain began about 2 weeks ago after he was bent over to pull the pin out of a camper jack. He has had multiple “back strains” as he calls them previously, but until now they have resolved on their own or with chiropractic care. The patient also states that he feels relief in his symptoms while lying on his back or after walking for a few steps. Sitting increases his symptoms. Patient also states that he went into the clinic the end of the previous week for this and was prescribed muscle relaxers and was referred to Physical Therapy. The muscle relaxers seem to help some, but pain is still a 4-5/ 10 currently, and reaches an 8-9/10 with certain movements. Patient is a retired farmer but is still very active around the farm as well as with his grandkids. He states that recently he has been needing the help of his wife in order to get dressed in the morning due to his pain.

### Examination, Evaluation and Diagnosis

Our evaluation was based on the McKenzie Method of Mechanical Diagnosis and Therapy approach for a lumbar derangement.<sup>4</sup> The patient presented with poor

posture, including a forward head and rounded shoulders. A relevant lateral shift was present. He ambulated with a major antalgic gait due to pain, needing to walk close to the walls for support to maintain an upright position. He also had a decreased step length on the left, as well as decreased time spent in SLS on the left side. Strength was tested in the lower extremities, and was 5/5 bilaterally, except for hip flexion which was 4/5 bilaterally. Pain was produced with resisted knee extension on the left side, but was still assessed as normal or 4/5 strength. Lumbar range of motion was assessed in regards to how limited it presented compared to the expectation of full range of motion. The results of the range of motion testing are shown in Table 1.

**Table 1.** Initial Lumbar Active Range of Motion.

Flexion	Max limited due to pain
Extension	Mod limited due to pain
Right Side Bend	Max limited due to pain
Left Side Bend	Max limited due to pain

Sensation was not formally assessed at this time due to no current complaints of numbness or tingling, but was monitored throughout the treatment sessions. The patient presented with a positive Modified Slump test, with an increase in symptoms being noted with sitting and looking down. The Slump test has an interrater reliability ICC= 0.92 and a SEM= 3. The sensitivity and specificity of the Slump test are .84 and .83 respectively.<sup>10</sup> The test retest reliability ICC= 0.80 and a SEM= 5<sup>11</sup>. Myotomes were intact L1- S2.

Initial evaluation showed a directional preference towards extension, with subjective findings indicating a lumbar derangement<sup>4</sup> due to the onset of his pain, the changing symptoms that he felt throughout the 2 weeks that he had been suffering from it, and the history of back pain that he stated. Goals for this patient included increasing ROM, decreasing pain, improving gait mechanics, and establishing a home exercise program for further management of his symptoms as well as for prophylaxis to prevent any future injury like this one. All of these goals were developed to help this patient return to independent completion of his ADL's as well as to perform his usual functional activities, returning to his active lifestyle.



## CHAPTER III

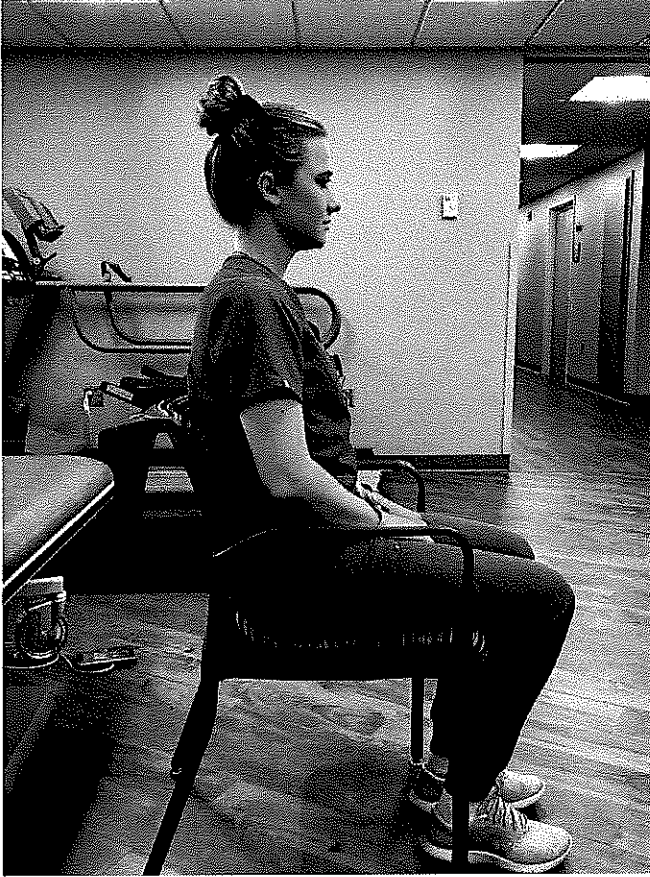
### INTERVENTION

This patient was seen 2 times per week for 5 weeks with a lapse in the middle of the episode of care due to a holiday. Total number of sessions was seven. The first week's intervention's included a manual right lateral shift correction to address the relevant lateral shift that was present ( Figure 1), as well as education on completing the self-lateral shift correction to be completed as a home exercise.



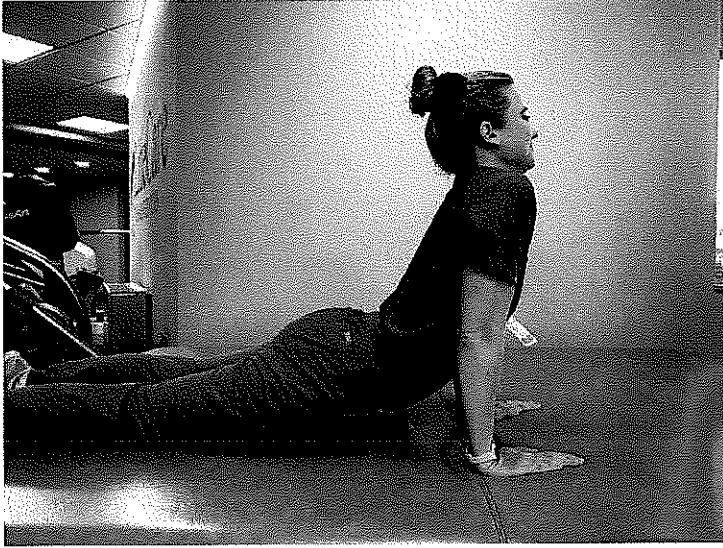
**Figure 1.** Manual correction for a right lateral shift.

In addition to this exercise, postural education was given, and the patient was instructed to roll up towels to place in the curve in his low back while sitting (Figure 2).

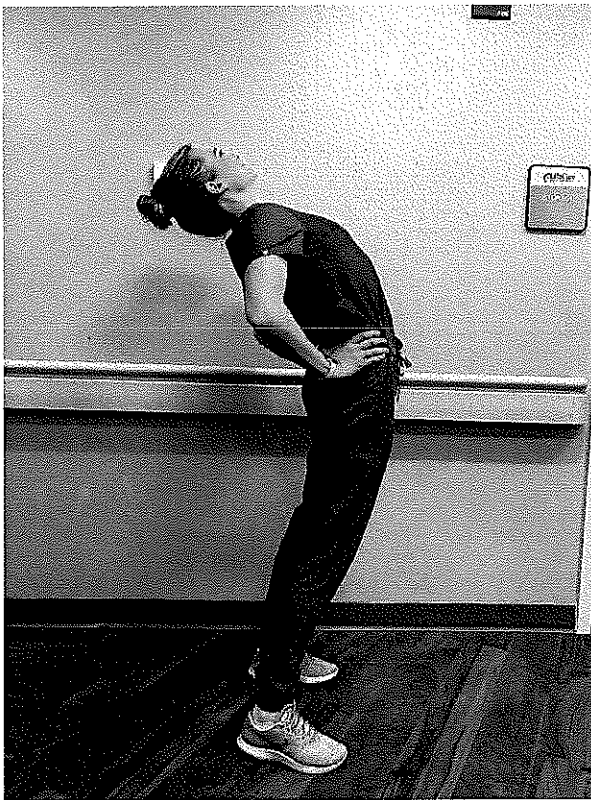


**Figure 2.** Postural Education involving the use of a lumbar roll.

Standing or prone lumbar extensions were also given to be done at home, alternating between the lateral shift correction and extension exercises (Figures 3 and 4).



**Figure 3.** Prone lumbar extensions.



**Figure 4.** Standing lumbar extensions.

After the first week, he noticed a significant decrease in his radicular pain, rating it a 2/10. Lumbar range of motion improved to WNL into flexion and minimally limited into extension.

The second week's treatment was much the same as the first week's treatment, with the lateral shift correction being discontinued due to no presence of a shift upon observation. The patient was progressed through the McKenzie force progression, starting with the lowest mechanical forces placed on the spine, which is known as prone on elbows. We progressed to increasing force to get full reduction of the derangement as the patient was able to tolerate, or once a plateau in symptom reduction occurred. The subsequent progression included prone press ups, and ending with prone press ups with self-overpressure at the end of the press up, which was achieved by breathing in and out and letting the spine sag down at the end of the press up. The patient was instructed to complete the prone press up with the self-overpressure or he could perform the standing extensions if he was unable to get into the prone position every 1-2 hours for further treatment of his pain.

By the third week, the patient rated his pain as 0/10, but complained of numbness at his knees. Dermatomes were tested and were intact bilaterally, and McKenzie exercises were continued. The patient was extensively educated on prophylaxis for his back pain, as well as the results of his recent MRI, which showed a sequestered disc at the level of L2-L3. The patient was also planning on traveling to see family, so patient education about the best way to sit while traveling (i.e. maintaining lumbar lordosis), without increasing pain, was completed and a lumbar roll

was given to the patient along with instructions and demonstration on how and when to use it.

At Week 4 of treatment, the patient wasn't seen due to being out of town. During the fifth week of treatment, the patient returned to physical therapy much the same as he was the last visit. Numbness still persisted in his knees, so extension mobilizations were completed to the upper lumbar spine with hopes of fully reducing the disc. These mobilizations were completed with the assumption that his sensation changes were due to the L2-L3 sequestered disc material irritating the nerve root, causing his numbness at the L3 dermatome. No change was noted after this treatment, and the patient felt that he was back to normal as far as pain so he was discharged from formal Physical Therapy services. He was also educated to recognize that this sensation change may take some time to fully resolve, and will get better as the disc material continues to reduce and get broken down. The patient's and the physical therapist's goals were met, and he was educated to continue with the same extension exercises that he had been previously doing if and when symptoms returned. Table 2 shows the lumbar range of motion at discharge.

**Table 2.** Lumbar Active Range of Motion at Discharge.

Flexion	WNL
Extension	MIN limited
Right Side Bend	WNL
Left side Bend	WNL

## CHAPTER IV

### DISCUSSION

The patient achieved significant improvements in range of motion as well as pain in a 5 week time frame, and met his goals for functional activity. He began treatment with max limited side bending and flexion, which made him unable to complete lower body dressing and farm responsibilities. He began with 9/10 pain, and antalgic gait pattern, and maximally limited range of motion in his lumbar spine, and was able to achieve 0/10 pain, a normal gait pattern, and a functional range of motion, despite the MRI results of a sequestered disc in his lumbar spine. It was imperative that the lateral shift was corrected before extension biased treatment began for optimal recovery.

Based on the patient's response to the treatment in addition to the reduction in symptoms that he felt, this treatment was effective. Current research supports the use of the McKenzie method for treatment, especially when the patient responds to repeated movements with centralization of symptoms.<sup>3</sup> Although this patient presented with a new onset of low back pain, he had suffered from low back for years previously, with only this incidence requiring him to seek medical treatment. Because of this, his low back pain would be considered chronic in nature. This chronicity further supports the use of MDT as the treatment for the reduction of pain and disability.<sup>4</sup>

The fact that entry level physical therapists are trained at the basic level to treat patients with the use of MDT also aided in the recovery of this patient. In addition, the Clinical Instructor that was in charge of this patient's care had completed Continuing Education in the use of Mechanical Diagnosis and Therapy. Research has also shown a better outcome for those patients who were treated with the MDT approach by therapists who had received training in the area.<sup>3</sup> Overall, research supports the use of the McKenzie method for treatment of chronic low back pain, just as this patient presented with. The results from the treatment also came to the same conclusion, showing an overarching positive outcome.

### **Reflective Practice**

If a patient with a similar presentation were to come to the clinic for services in the future, there are a few things that I would possibly change, but overall research shows that MDT is the superior approach to treating patients with chronic low back pain.<sup>3</sup> Taking a thorough history is one of the most important parts of treating a patient with chronic low back pain, and I feel that we did just that with this patient. A large portion of the initial evaluation consisted of asking questions that helped lead to a plan of care for the patient.

It may be important to add additional special tests to the examination procedures, such as the SLR, to determine lumbar or sacral involvement. This needs to be taken on a strict patient-to-patient basis, based on the severity of the patient's pain. In this case, further special tests and measures were omitted due to the significance of his pain and the discomfort that he was having just sitting through the initial history taking. We felt



that it was unnecessary to continue on with any further tests and moved into treatment right away to try and give the patient some relief.

Overall, the patient's plan of care stayed the same, even after the results of the MRI were received showing a sequestered disc at the level of L2-L3. These results were received well into the patient's treatment, and positive results were seen in range of motion as well as function, so it was obvious that our treatment was effective. The results of the MRI, however, did foster additional patient education on what the results mean and the prognosis of his injury that may not have been as specific if it weren't for imaging. Due to the expansive degeneration of the patient's spine, it was impossible to tell exactly what was causing his pain, only that there were some areas specifically in his lumbar spine that showed abnormalities and degenerative effects. I do not feel that these images were medically necessary, mainly due to the fact that the patient's plan of care did not change following the imaging, and no further treatment was needed.

Going forward, I would have liked to have seen this patient a couple more times to set him up with a core and lower extremity strengthening program to increase his chances of a full recovery without relapse. This patient felt that all of his goals were met at this time, and we made a mutual agreement that discharge was appropriate, with the understanding that if his symptoms returned that he would come for physical therapy services again.

An interdisciplinary approach was taken for this patient, and the primary care provider played an active part in the patient's rehabilitation. There was frequent communication with the physician that allowed us to give the patient the best care

possible, and to address all of his concerns, specifically when they were out of the scope of practice for a physical therapist. An example of this would be his concern about his acute increase in blood pressure following the injury, which resolved after treatment for his lumbar derangement. In addition to speaking with the primary care provider, the patient also voiced the interest in seeking the care of a neurosurgeon, which was handled by his primary care provider, and the appointment was made after his discharge from formal physical therapy services. Education on this decision was given during therapy treatments, with the therapist opinion that it was unnecessary, but the final decision was given to the patient, as it always should be.

Further research needs to be done on the effectiveness of MDT for both chronic and acute low back pain to further evaluate its effectiveness in relationship to other interventions, including Back School, motor control exercises, and manual therapy. Research thus far is promising, but larger studies including meta-analyses need to be completed to further show the positive effect that the McKenzie method has on treating low back pain.

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