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Physical Therapy Management of an Interesting Lumbar Radiculopathy: A Case Study

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ABSTRACT

Case study presenting successful physical therapy management of a lumbar radiculopathy with MRI findings consistent with disc herniation. Interesting clinical presentation and response to treatment discussed in this case.

Background:

Lumbar radiculopathy ranks among the most frequent concerns assessed by the healthcare community. Its prevalence is estimated at 3% to 5% of the population, affecting both genders. Advancing age stands out as a significant risk factor, stemming from the degenerative changes occurring in the spinal column [1]. Symptoms typically manifest in middle age, with men experiencing onset often in their 40s and women in their 50s or 60s. The condition is generally more common in men than women. Degenerative spondyloarthropathies represent the primary culprits behind lumbar radiculopathy. Patients usually report low back pain along with electric, burning, or sharp pain down one or both legs. Irritation at a specific nerve is usually the underlying cause of a radiculopathy, and this irritation can occur at many different points. There is normally a compressive force at the thecal sac as the nerve root exits the thecal sac, in the neural foramina, or potentially after exiting the neural foramina. Possible contributing factors include disc bulging or herniation, facet or ligament hypertrophy, spondylolisthesis, or neoplastic and infectious conditions [2]. Diagnosis of the underlying cause and subsequent treatment commences with a comprehensive physical examination [3].

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Disc herniation within the spinal column is a condition where the nucleus pulposus shifts out of its normal position within the intervertebral space and protrudes through the annulus fibrosus, a tough collagenous ring surrounding it [4]. This pain can extend to the lower extremities, presenting as a burning or stinging sensation and may be accompanied by altered sensation or muscle weakness.The degenerative process that weakens the nucleus pulposus with age is the primary cause, exacerbating symptoms over time. Additionally, disc herniation may result from congenital anomalies, connective tissue disorders, or trauma, occurring more frequently in the lumbar and cervical regions due to biomechanical stresses, with the thoracic spine less commonly affected. Surgical intervention or interventional techniques may be necessary for refractory cases, although most instances can be managed conservatively [5].
Herniated discs typically result in localized inflammation and mechanical compression of nerves due to the protruding nucleus pulposus. Posterior lateral herniations often compress nerve roots due to thinner annulus fibrosus and reduced structural support. Large midline disc herniations may lead to clinical myelopathy and spinal cord compression. This combination of chemical irritation and disc pressure on the longitudinal ligament contributes to localized back pain. Symptoms of herniated discs also include pain, tingling, numbness, sensory deficits, weakness, and instability [5].

Case Presentation:

A thirty-one year old female presented to PT with a referral from her primary care physician for “Sacroiliitis”. She had symptoms of low back pain with pain radiating down the back of both legs and tingling in her 4th and 5th toes bilaterally. The pain started four weeks prior to PT visit when she was sitting on the floor and bent forward. Pain was initially located at the lumbar region and progressively began to radiate down legs 2-3 days after injury. Since the injury she has seen her primary care physician and been prescribed and taken two rounds of Medrol Dosepak. Both rounds of medication fully resolved her symptoms while taking the medication, however her pain returned after completing the medication each time. Pain was rated utilizing Numeric Pain Rating Scale (NPRS) [6]. Current pain was rated 0/10 and worst pain was rated at 8/10 on NPRS. Aggravating factors were reported as standing and bending down to lift. Easing factors were sitting and flexing the trunk to rest hands on knees. The patient denied any saddle anesthesia or bowel and bladder changes [7]. Significant PMH included two pregnancies with vaginal birth and did report history of low back pain during these pregnancies. Most recent childbirth was two years ago. She presented with lumbar X-rays with findings of dextro curvature of the lumbar spine centered at L3 with Cobb angle measuring 13.3 degrees. Preserved vertebral body height. Preserved disc height. MRI had been ordered by PCP at initial evaluation, but was not completed until after the third PT visit. MRI, when completed had findings of L5/S1 disc herniation with R sided S1 nerve root impingement.

Initial Examination Findings:
Lumbar ROM was limited through flexion, extension, rotation, and lateral flexion by about 50% for all directions. Increased pain was reported with lumbar Extension, lumbar lateral flexion bilaterally, and lumbar rotation bilaterally. No increase in pain with lumbar flexion.
Dermatome testing: Altered sensation reported at S1 nerve distribution [8].
Myotome testing: Weakness found at L4 myotome on L [9].
Normal L3 and S1 reflex [8].

Lower Extremity Manual Muscle Testing (MMT) [10].

	Right	Left
Hip Flexion	4+/5	4/5
Hip Abduction	4/5	4/5
Knee Flexion	5/5	4+/5
Knee Extension	5/5	4/5
Ankle Dorsiflexion	5/5	5/5
Ankle Plantar Flexion	5/5	5/5

Special Tests:
Lumbar Special Tests: Negative Straight Leg Raise (SLR) [11].

Manual Joint Assessment
Local pain reported with Central Posterior to Anterior (CPA) L3-L5 [12].

Palpation: Tender to palpation at lumbar paraspinals musculature

Differential Diagnosis: Acute Low Back Pain with Radiating Pain [13] was the leading hypothesis in this case with consideration given to infection or space occupying lesion in lumbar spine given reported irritability, acuity, and presence of myotome weakness as well as bilateral paresthesia.

Treatment: Treatment approach initially focused on reducing radicular pain complaints and decreasing paresthesia through positioning, repeated movements, and manual therapy. The manual therapy technique that was most effective for this patient was lumbar traction performed with legs resting on 55cm physioball. Manual pull was directed through ankles bilaterally. It is hypothesized that this positioning of the leg on the physioball allowed for a more flexed lumbar spine posture which was the easing movement for this patient. Throughout the 12 visits over a period of 3 months the patient continued to have a positive response from this manual therapy technique. During the initial physical therapy visits when the radiating pain and paresthesia was most severe the patient would report a full resolution of radicular symptoms for up to 3 days

following treatment intervention. Manual therapy was always followed with repeated lumbar flexion movements and core stability exercises which consisted of marching in hook lying position, hip abduction in hook lying position, and knee and hip flexion stretching. As symptoms improved through physical therapy intervention the treating physical therapist progressed the exercises to more challenging core stability exercises.

Outcome:

- Oswestry Disability Index [14]: 30% at initial evaluation, 2% at last visit
- Pain: 8/10 on NPRS at initial visit to 0/10 on NPRS at last visit [6]
- Strength (MMT) [10]:
    - | | Right | Left |
    - | Hip Flexion | 5 | 5 |
    - | Hip Abduction | 5 | 5 |
    - | Knee Flexion | 5 | 4 |
    - | Knee Extension | 5 | 5 |
    - | Ankle Dorsiflexion | 5 | 5 |
    - | Ankle Plantar Flexion | 5 | 5 |
- Lumbar AROM improved to 100% for flexion and rotation bilaterally and 75% for lumbar extension and sidebending bilaterally

Discussion

Low back pain with radiating pain was the final diagnosis for this patient. This is a common condition seen and managed by physical therapists. This condition has been studied written about extensively for both medical management and physical therapy management, however this case represented a few interesting findings that warranted further investigation and reporting. The first interesting finding was that the patient's mechanism of injury was also the same position of relief throughout treatment and recovery. The injury occurred while sitting and bending forward; however sitting, bending forward, and lumbar flexion biased manual traction were all the positions of comfort and pain reduction throughout treatment. It is the author's opinion that a clinical presentation such as this one would more typically improve with movements in the opposite direction, and this case represents an exception to that.

Another interesting finding of this case was the MRI findings not correlating with clinical myotome and sensory testing findings. The radiologist's MRI report described L5/S1 disc herniation with R sided S1 nerve root impingement, however the patient had clinical presentation of bilateral S1 sensory changes [8] and left sided L4 myotome weakness [9]. It could be theorized that the inflammation associated with the disc herniation may have affected other nerve root levels aside from where it was viewed on the MRI. It could also be hypothesized that given that the MRI did not fully appreciate the extent of the patient's injury. An MRI is a static picture of one window of time. There could have potentially been other disc

herniations present which were not visualized in the position the patient was in at that time [15]. This could also be associated with poor validity found with current clinical myotome and dermatome testing and mapping [16].

The case also presented an interesting and challenging view of how physical therapists manage red flags and when a referral to a surgeon is warranted. For this case, the patient only saw her primary care physician and physical therapist for the condition. The patient also did not have the finding of her MRI until the third PT visit. Close monitoring of worsening neurologic weakness and paresthesia was assessed at every visit. The patient would have been referred to the emergency department or urgently referred to a spine surgeon if the myotome weakness or paresthesia had begun to increase in severity or distribution. Throughout physical therapy intervention however the patient's clinical presentation continued to show gradual improvement with full resolution of myotome weakness and paresthesia at the end of the physical therapy plan of care.

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