

Case Report

# METASTATIC CANCER OF THE LUNG AND LUMBAR SPINE MIMICKING LOW BACK PAIN: A CASE REPORT

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## ABSTRACT

The purpose of this case study is to describe the presentation of a patient with persistent back pain and leg pain with no prior diagnosis of cancer and to describe the clinical course of a patient referred to physiotherapy (PT) for treatment, which was subsequently diagnosed with metastatic cell carcinoma of the lung and bone. A 76-year-old woman was referred to PT for the evaluation and treatment of an insidious onset of low back and leg pain of 3-month duration. She had positive neurologic signs or symptoms suggestive of radiculopathy, recent weight changes, and general health concerns. She received mild relief during the first office visit, including manipulation, tecar therapy, moist heat, and electro-acupuncture stimulation. Although the patient experienced some pain relief after her physiotherapy treatment, she continued to have persistent mild pain in the lumbar area. The patient's history and physical examination were consistent with a mechanical neuromusculoskeletal dysfunction, and no red flag findings warranted immediate medical referral. Short-term symptomatic improvements were achieved using PT treatment. However, despite 5 PT sessions over 5 weeks, the patient did not experience long-term symptomatic improvement. On the fifth session, the patient reported a 7-day history of right hand and leg weakness and breathing problems. This prompted the physiotherapist to refer the patient to the emergency department. Abnormal examinations and radiographic findings were discovered. A subsequent computed tomography scan of the lumbar spine revealed marked metastatic changes to the lower thoracic and upper lumbar spine. The patient was immediately referred to the pulmonologist and oncologist. This case highlights the importance of patient health history and further investigation of the red flags of persistent pain in patients. Differential diagnosis is a key component of PT practice. Low back pain recurrence in an established patient should constitute a reevaluation of the problem. The cause cannot be assumed to be musculoskeletal in origin, even though this may have been the case with the initial complaint. Metastatic disease should be considered with any type of recurrent low back pain. The ability to reproduce symptoms or achieve short-term symptomatic gains is not sufficient to rule out threatening pathology.

**KEYWORDS:** lung cancer, diagnostic imaging, metastatic carcinoma, differential diagnosis, low back pain

## INTRODUCTION

Cigarette smoking is the leading cause of lung cancer, but 15% of patients with the disease have never smoked (1-6). Thirteen to 15% of all lung cancers worldwide are small cell carcinomas. This type of cancer is aggressive, is usually central in location, and is associated with mediastinal involvement. This case study describes the management of a patient who complained of low back pain. Despite a similar presentation in this patient's history, recognizing a

Received: 5 May 2024  
Accepted: 12 June 2024

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potentially different etiology led to the clinical decision to perform a reexamination. Lung carcinoma with metastasis in the spine was eventually diagnosed as a result of this examination.

Low back pain is a common condition, and physiotherapists (PT) routinely manage patients with this complaint. While the prevalence of severe medical pathology (i.e., cancer) causing low back pain is extremely low, it is the responsibility of the physiotherapist to screen and monitor for medical conditions and determine if referral to another health care practitioner is indicated. Lung cancer commonly metastasizes to the skeletal system, and when affecting the spine, it may initially be mistaken for a typical musculoskeletal source of back pain.

These screening strategies allow the physiotherapist to proceed with the patient's care and avoid unnecessary physician referrals. Some threatening pathology may present initially with musculoskeletal symptom patterns, including the ability to reproduce or reduce symptoms through mechanical means (7-9). Therefore, it is imperative for physiotherapists to frequently reevaluate their patient's response to intervention since signs and symptoms of severe underlying disease can develop at any point in the course of care. Evidence-based strategies can be utilized to screen for medical pathology that can mimic mechanical low back pain. If a red flag is present, evidence-based screening strategies suggest that lumbar spine radiographs and laboratory testing (erythrocyte sedimentation rate) are the next appropriate steps to rule out cancer as the cause of low back pain. However, suppose the concern persists without abnormal laboratories and/or radiographic findings. In that case, advanced diagnostic imaging should be used to screen for cancer as a source of the pain. This report describes the clinical course of a patient referred to physiotherapy for the treatment of low back pain, who was subsequently diagnosed with cell carcinoma of the lung with metastases in the spine.

## CASE REPORT

### *Patient characteristic*

The patient was a 76-year-old woman. She enjoyed occasional walking for physical activity daily. She was initially evaluated in the emergency department the day after the onset of low back pain symptoms. Lumbar radiographs were significant for degenerative changes at the L4- L5-S1 level. She was diagnosed with a lumbar strain, prescribed ibuprofen, and asked to follow up with her primary care physician if she did not improve. One month after symptom onset, there was no improvement when the patient was evaluated by her primary care physician. During this evaluation, the patient complained that her fatigue limited her daily activities.

The patient had a 5-year clinical history of fatigue but no associated depression. She also noted that the pain was unchanged with activity. At this visit, she was prescribed cyclobenzaprine, provided a general exercise handout, instructed in postural education, advised on activity modification, ordered to rest and use manipulation, diathermic heat electroacupuncture, and referred to PT.

### *Examination*

At the PT's initial evaluation, the patient's chief complaint was upper lumbar pain centered at L4-L5-S1 and described as an intermittent, variable, and dull ache with referral into the buttock or lower extremities. Aggravating factors included sitting and lifting objects while easing factors included standing and sleeping. The patient noted that her symptoms were most intense in the evening and that the pain occasionally caused her difficulty falling asleep. She reported that her symptoms were more intense in the afternoon and while taking medications prescribed for her pain. Her symptoms were insidious and began 5 weeks before the PT evaluation. There was no known cause for the pain.

At the time of the initial PT evaluation, the patient was only taking 500 mg of ibuprofen and aspirin twice daily and 10 mg of cyclobenzaprine three times daily. Despite her fatigue report to the primary care provider, she denied fatigue during her PT evaluation. She also denied fever/chills/sweats, shortness of breath, and upper/lower extremity weakness, but she suffers from high blood pressure. There was evidence of little weight change, and there was no history of cancer. The patient reported a recent onset of constipation and difficulty maintaining her balance while walking, which she felt was associated with the intake of ibuprofen and cyclobenzaprine. The physiotherapist recommended that the patient contact her physician for medical evaluation of these potential side effects of the cyclobenzaprine. She had a regular gait pattern, and transitional movements were normal without signs of guarding. Balance testing was not performed at the initial evaluation. Pelvic alignment was level in standing, and her thoracic kyphosis and lumbar lordosis were unremarkable.

No erythema, ecchymosis, or edema was seen in the thoracic, lumbar, or sacral regions. Lumbar active range of motion in standing was within normal limits with flexion and left lateral flexion, causing a slight increase in pain. The patient's passive range of motion was within normal limits bilaterally and did not reproduce her symptoms. With the

patient in the prone position, central posterior to anterior pressures at the L4-S1 vertebral levels were hypo-mobile and reproduced concordant symptoms. The straight leg raise testing was sometimes done with pain.

Respiratory examination revealed increased respiratory effort, moderate right side, and percussive dullness postero medially and postero laterally. Palpation revealed severely decreased tactile fremitus on the right lower lateral and lower medial chest wall and moderately reduced breath sounds on the right posterolateral and posterior medial chest wall. No lymphadenopathy was noted. A mildly abnormal finger-to-nose test result was also present. Radiographic images were ordered and displayed evidence of a lung mass. The patient was informed of the findings and immediately referred to a computed tomography (CT) of the lungs and to see a pulmonary specialist. The CT confirmed the right upper lobe mass. The patient was subsequently under the care of the pulmonary specialist and oncologist. Magnetic resonance imaging of the head and whole-body positron emission tomographic scan and a biopsy taken by the pulmonary specialist were ordered. The patient was subsequently found to have metastatic lung carcinoma and was treated with chemotherapy and radiation treatment.

### *Clinical impression*

Red flags for threatening pathology were not present at the initial evaluation but were of minimal concern when coupled with the patient's history and physical exam. More specifically, the patient had recently reported fatigue but also had a known 5-year history of fatigue associated with her back pain. She reported recent episodes of constipation, but she associated this with a recent change in her medications. The pain was in the upper lumbar region, which was of concern given her previous history of a herniated disc; however, her kidney function tests had returned normal, and she reported that the current symptoms did not feel similar to those of her previous. Even though the patient had no prior cancer history, the common indicators of cancer (i.e., age >50, intermittent symptoms, and the physical exam) mimicked what one would expect of a patient with a malign musculoskeletal condition.

The most pertinent exam findings were:

1. pain primarily in lumbar flexion positions (sitting);
2. pain relieved by lumbar extension positions (standing);
3. active lumbar flexion and left-side bending reproduced her symptoms;
4. L4-S1 was tender to palpation and hypomobile on spring testing.

### *Intervention*

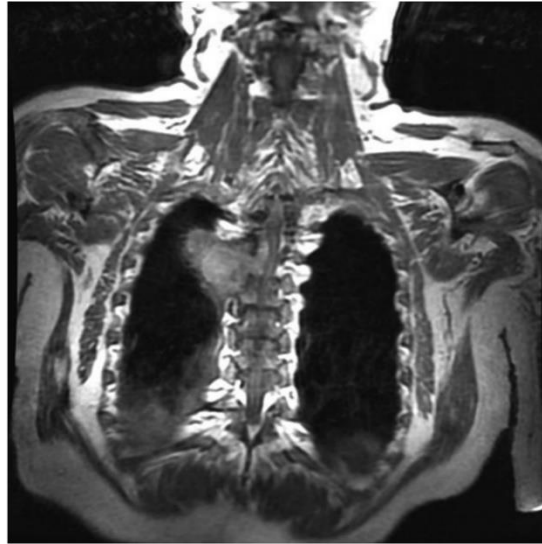
The intervention focused on increasing postural awareness to avoid lumbar flexed positions while increasing L4-S1 mobility and thus reducing pain. The patient's positive response to an extension-based exercise indicated the best treatment approach was likely specific exercise. A home exercise program was provided, including continuing her walking program and performing 10-15 repetitions 2 times per day. For this reason, a PT follow-up was scheduled for 1 week. At the time of the PT follow-up visit 2 weeks later, the patient reported no change in her symptoms per the global rating of change scale score=0 despite reported compliance with the home exercise program. The patient reported 4/10 resting pain in sitting, which was unchanged by standing. Her lumbar active range of motion was slightly decreased in flexion and left lateral flexion. Lumbar flexion increased the patient's upper lumbar pain to 6/10. Meanwhile, left lateral flexion induced right-sided upper lumbar paraspinal pain. The physical examination was otherwise unchanged from the initial evaluation.

The patient was treated with a neutral-gap lumbar thrust mobilization-targeted at L4-S1. We put electroacupuncture and tecar therapy in the lumbar region. After the lumbar thrust mobilization and electrotherapy, her lumbar flexion and left lateral flexion range of motion improved to within normal limits, and her pain was reduced. She was asked to continue her initial home exercise program for another week. At her second follow-up visit with the physiotherapist 3 weeks following her initial evaluation, the patient reported that her symptoms were a little worse. She stated that her symptoms worsened 12 days after initiating PT and that her symptoms were no longer relieved with her medications. She reported compliance with her home exercise program but no longer felt pain relief from the exercises. Her pain during rest had increased to 7/10 while sitting, which was reduced with standing and supine manual lumbar traction. Lumbar extension was standard, and the pain was unchanged compared to resting. Lumbar forward flexion range of motion was decreased and continued to be the most provocative active motion.

### *Outcome*

The patient completed two manipulation treatments, although afterward, the patient did not experience any lasting improvement in symptoms. On arrival for her fifth appointment, she complained of a headache, right-sided leg extremity numbness and tingling, dropping items, and feeling unbalanced for the previous 2 days. She was escorted to

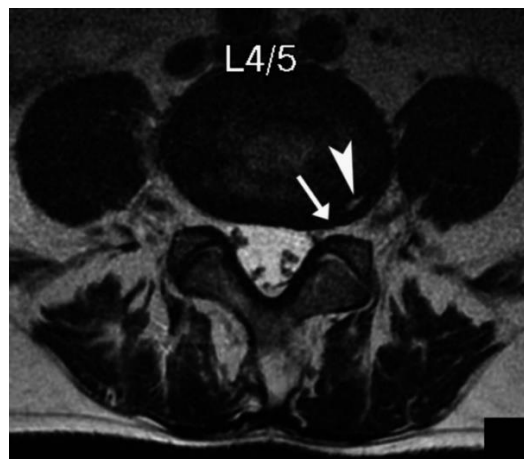
the emergency department for immediate medical evaluation. A computed tomography scan of the lung was completed in the emergency department. Chest, abdominal, and pelvic MR demonstrated a 3.8 cm left cancer mass and osseous lesions involving L4 and S1. A computed tomography-guided biopsy of the left lingular mass led to a diagnosis of cell carcinoma of the lung with metastases to the spine. Spinal magnetic resonance imaging showed diffuse lesions throughout the vertebral bodies consistent with metastatic disease, with the largest lesion at L4-L5-S1. Despite radiation therapy and chemotherapy, the patient succumbed to cancer 6 months after she was first seen in PT (Fig. 1-3).



**Fig. 1.** MRI lung cell carcinoma.



**Fig. 2.** MRI Metastatic carcinoma of the spine.



**Fig. 3.** Axial lumbar MRI image at the level of the L4-S1 intervertebral disc.

## DISCUSSION

This case was an unusual presentation of metastatic disease that onset as mechanical low back pain and leg pain. In many instances, a patient with metastatic disease complains of night pain, intense pain at rest, and unexplained weight loss.

The case is an example of the “red flags” that are sometimes not acknowledged. This patient's “red flags” were considerable weight loss in a short time, sweating, and fatigue. However, magnetic resonance of the cervical, thoracic, and lumbar spine revealed no central nervous system lesions. Lung cancers usually present symptoms resulting from the primary tumor or metastatic disease or the effects of unusual hormone production, with symptoms depending on the location of the disease. In stage 4, cell carcinoma of the left upper lobe, as found in this case after biopsy, the clinical presentation due to the primary tumor might include signs of respiratory distress, superior vena cava obstruction, and recurrent. The 4 most common sites of metastasis from primary lung malignancy are the bone, brain, liver, and adrenal glands. Hematuria and pyuria may also occur. The patient discussed here did not report any symptoms that directed the PT to a primary diagnosis of metastatic cancer. The PT was concerned due to the patient's age, lack of a significant mechanism of injury, and the chronic, recurrent symptom presentation. The PT opted for lumbar spine radiographs before proceeding with treatment.

The spine accounts for 83% of bone metastatic lesions and is one of the most common sites for the early presentation of metastases (1-9). Cancer of the breast, lung, and prostate are the most commonly associated with bone metastases, and up to 50% of patients with these types of cancer develop bone metastases. Approximately 60% of bone metastases are found in the axial skeleton. Studies have shown that the majority of skeletal metastases can be asymptomatic, with cervical and lumbar metastases tending to be more symptomatic than those in the thoracic spine. Unfortunately, metastatic disease is typically widespread by the time patients present symptomatically to the clinic.

Once symptoms are present, delays in diagnosis can be significant. Studies have shown symptom-to-diagnosis delay in lung cancer to be approximately 1-3 months. Misdiagnosis and misinterpretation of tests are two factors contributing to practitioner delay. The inherently poor sensitivity of radiographs in detecting metastatic lesions can lead to misdiagnosis, adding to practitioner delay. More specifically, 30-50% bony destruction is necessary for a lytic lesion to appear on radiographs, suggesting that some metastatic lesions may go undetected by radiographs for a considerable time. In our case, total diagnostic delay was approximately 90 days, with 40 days attributed to practitioner delay. Notably, the patient had received conventional radiographs of the lumbar spine at her initial presentation to the emergency department, which showed no signs of metastatic disease.

Considering the advanced stage of our patient's cancer, it is unlikely that the outcome would have changed dramatically with a more suitable diagnosis. However, a timely diagnosis may have provided a psychosocial benefit to the patient and her family. Studies have shown that preparation for death is a key factor in making the dying process more favorable for patients and their families (6-9). Our patient survived approximately 6 months after diagnosis. It is worth noting that our patient did not initially exhibit the typical characteristics of threatening pathology. Several factors emerged throughout treatment, which indicated that her symptoms were not solely of musculoskeletal origin. More specifically, the patient's initial report of fatigue affecting her activities of daily living, her lack of response to treatment with gradually worsening symptoms, and the location of her symptoms in the upper lumbar spine were concerning.

While several components of this patient's history and physical examination were consistent with a mechanical musculoskeletal dysfunction, the location of the patient's symptoms (upper lumbar spine) was concerning. Upper lumbar pain has been associated with visceral referral from the kidneys. In addition, the upper lumbar spine is one of the most common sites for vertebral compression fractures. Most non-musculoskeletal causes of back pain do not specifically target the upper lumbar spine. Threatening pathologies propagating through hematogenous seeding can be spread throughout the body, with areas near the venous/lymphatic drainage being the most highly affected. In the case of lung cancer, the thoracic spine is the most common region for spinal metastases. The upper lumbar spine only accounts for 2-5% of lumbar disc herniations, 30% of central canal stenosis, and 9-12% of lumbar degenerative disc disease (DDD).

Threatening pathology is commonly thought to present as constant, unwavering pain that is unchanged by joint movement or altering body positioning and may become worse at night. However, metastatic lesions of the spine may mimic musculoskeletal pathology, as symptoms are often reproducible by active/passive movement and can ease with position change or rest. During the PT evaluation, the patient exhibited intermittent symptoms that were changed with position and mechanical intervention and were subjectively eased by sleep. The patient experienced short-term gains with both manual intervention electrotherapy and a directional preference exercise but lacked any sustained improvements.

While intersession gains with manual intervention have been shown to be an indicator of favorable prognosis, it is pertinent to note that intersession or short-term symptomatic improvements did not sufficiently rule out threatening pathology.

As treatment ensued, the patient began to complain of intractable pain that was unchanged by either mechanical or pharmaceutical interventions. Also of concern were her new development of headaches, right-sided upper extremity numbness and tingling, dropping items, and a decreased sense of balance. Lack of improvement with conservative therapy after a one-month period has been shown to be an indicator of underlying a threatening pathology.

## CONCLUSIONS

This case outlines the need for clinicians specializing in musculoskeletal disease to consider visceral sources of pathology in returning cases, especially if findings are inconsistent with musculoskeletal findings. Low back pain recurrence in an established patient should constitute a reevaluation of the problem. The cause cannot be assumed to be musculoskeletal in origin, even though this may have been the case with the initial complaint. Metastatic disease should be considered, along with any type of recurrent lower back pain.

While the prevalence of serious medical pathology causing low back pain is low, it is the responsibility of the physiotherapist to screen for serious medical conditions and continuously monitor the development of those conditions throughout the course of care. PT treats musculoskeletal complaints such as low back pain daily. In some instances, visceral problems can be presented as mechanical low-back conditions. When a patient presents characteristic features, a correct diagnosis is easily made. It is often the case that clinical practice does not provide classic textbook examples, and the clinician must be vigilant by performing a careful history, examination, and other indicated procedures to rule out life-threatening conditions. Our patient presented symptoms of mechanical low back pain but was later found to have spinal metastases originating from cell carcinoma of the lung.

The ability to reproduce symptoms with movement or palpation, or even the ability to achieve short-term symptomatic improvement through mechanical interventions, does not rule out the possibility of threatening pain sources. Failure to achieve long-term symptomatic improvements with conservative management can be an indicator of threatening pathology and provides sufficient cause for medical referral. Physiotherapists should use additional caution during differential diagnosis of low back pain, especially when these symptoms are of unknown origin and are in the upper lumbar spine.

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