Differentiating Hip Versus Back Pathology with a Patient Status Post Lumbar Laminectomy and Fusion: A Case Study

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ABSTRACT

Background: In older adults with normal degenerative changes, it can be difficult to differentiate low back pain from hip pain. The purpose of this report is to describe the role of differential diagnosis of hip from back pathology in a patient post lumbar laminectomy and fusion. Case Description: The patient was a 56-year-old female seen in physical therapy two months postoperatively. A thorough examination led to a differential diagnosis of intraarticular hip pathology and the patient was referred to an orthopaedic specialist. Outcomes: The patient was diagnosed with severe right hip osteoarthritis and scheduled for a right hip arthroplasty. Three months after surgery the patient had complete resolution of pain and return of function. Discussion: Physical therapists should always complete differential diagnosis and screen for additional pathologies. Groin pain, decreased hip internal rotation, decreased hip strength, and gait dysfunction are key findings to differentiate between back and hip pathology.

Key Words: differential diagnosis, hip osteoarthritis, hip pain, physical therapy

INTRODUCTION

Differentiating low back from hip pathology can be difficult due to overlapping pain referral patterns. Intraarticular hip pathology can commonly refer pain to the groin, anterior thigh, buttock, anterior knee, and lateral thigh regions. Similarly, with lumbar pathology, pain can be referred into the proximal, middle, and distal anterior thigh regions from the L1, L2, and L3 nerve roots respectively and buttock pain can originate from the L4 and L5 nerve roots. A thorough history and physical exam of the low back and hip areas can guide the practitioner in establishing the correct diagnosis in a timely and efficient manner, while helping to avoid the costly care and management of misdiagnosis. In older adults with normal lumbar degenerative changes, it can be especially difficult to differentiate pain originating from the low back from pain originating in the hip. A common example is differentiating degenerative back pathologies from intraarticular hip pathologies, such as hip osteoarthritis (OA).

Low back pain (LBP) is the second most common cause of disability in adults in the United States. More than 80% of the United States population will experience an episode of LBP sometime during their lives, making LBP a diagnosis very commonly seen by primary care clinicians and physical therapists. Over the past few decades, there has been an increase in the number of medical procedures for the low back, including spinal injections and surgery. Among elderly Americans, the increase in procedures is closely related to an increase in diagnostic imaging. Although magnetic resonance imaging (MRI) is highly sensitive, studies have questioned the relevance of MRI findings in terms of specificity and correlation with clinical findings. In one such study, MRI was performed on 67 individuals who had never had an episode of LBP or sciatica. In the group that was younger than 60 years of age, 20% were found to have a herniated nucleus pulposus. In the group that was 60 years of age or older, all but one person demonstrated degeneration or bulging of a disc in at least one lumbar level. In another study, 200 subjects without a history of LBP were given an initial exam and MRI of the low back and were followed over a 5-year period. Fifty-one subjects developed a new onset of LBP and had a new MRI taken within 6 to 12 weeks of the pain onset. Only 4% of the subjects showed MRI changes with probable clinical significance. These studies demonstrate the importance of correlating normal lumbar degenerative changes, such as joint space narrowing, disc degeneration, stenosis, osteophyte formation, and lumbar spondylolisthesis, with a thorough history and clinical exam, especially in older adults who would be expected to have age-related degenerative changes.

Hip arthritis is a much less common condition compared to LBP, with estimates being 3.2% of the population older than 55 years of age. Despite the fact that hip OA is less common than LBP, the two conditions often coexist. Hip OA can cause abnormal gait and spinal sagittal plane alignment and is associated with LBP. Hip and spine arthritis are also part of the same age-related degenerative process and therefore often coexist. In a prospective study looking at 344 patients waiting to receive hip arthroplasties, 49% reported LBP. Of these patients, 66% had resolution of back symptoms following their hip surgeries. In a study by Hsieh et al., LBP was found in 21% of patients who were scheduled to receive a hip arthroplasty, and the presence of LBP was statistically more common in those with a longer duration of hip symptoms. In their study of patients with coexisting lumbar spine and hip pathologies described as hip-spine syndrome, Ben Galim et al. followed 25 patients with severe hip OA and at least moderate LBP. They found that in the spine and hip regions, both pain and function improved significantly following hip arthroplasties. A key point recognized by the authors after the study was that in patients with both hip OA and LBP, the hip should be treated first.

Whether a patient is seen by direct access or is referred for any type of low back or hip pain, the physical therapist should be cognizant of the potential structures that could be causing the patient’s symptoms. As a practicing autonomous provider, it is the therapist’s responsibility to perform a medical screen, assess regions above and below the involved area, and to rule in or rule out other potential conditions. Figure 1 provides an algorithm for evaluation of low back versus hip pain with differential diagnosis based on the location of pain. There are other examples in the literature of using an algorithmic approach to help guide the practitioner in developing a hip differential diagnosis based on location of pain and information from...
CASE DESCRIPTION

The patient was a 56-year-old female who was referred to outpatient physical therapy two months after a lumbar laminectomy and fusion of L4-5 due to a lack of any improvement in both pain and function following the surgery. Her occupation as a materials engineer primarily consisted of desk work; however, she also needed to periodically climb ladders in tight spaces. A presurgery MRI indicated degenerative changes throughout the lumbar spine with a 4 mm anterolisthesis of L4 on L5. According to Watters et al., a degenerative lumbar spondylolisthesis can be defined as a forward or backward slip by at least 3 mm. Presurgery, the patient completed approximately one month of physical therapy treatment with a different physical therapist and also had corticosteroid injections with minimal relief. The patient completed a 6-week course of physical therapy following her back surgery. During that postsurgery time, her main complaints included overall right lower extremity weakness, hip stiffness, difficulty with stairs walking more than one-quarter mile, and pain with sitting or standing for longer than 30 minutes. The patient's pain was reported mainly in the right groin area as well as the right lateral thigh and the lateral and anterior aspects of the right knee region.

Tests and Measures

At the initial evaluation, the patient's resting pain score was 3/10 on the visual analog scale. Her Oswestry Disability Questionnaire score was 34% and her Roland Morris Questionnaire score was 10 out of 24. Both of these questionnaires are widely used to assess pain-related disability in persons with LBP, and both have demonstrated valid and reliable measures that are responsive to change. The patient's lower extremity neural screen was negative, demonstrating normal deep tendon reflexes, normal sensation, no abnormal strength findings in the L2-S1 myotomes, and negative neural tension in the sciatic and femoral nerves. Although her lumbar ROM was globally limited, it was painfree. Her single leg static balance was decreased for the right lower extremity as she was able to maintain balance for about 5 seconds. Her initial strength measurements assessed by standard manual muscle testing (MMT) are listed in Table 1. Her hip goniometric passive ROM measurements, which were taken in supine, are listed in Table 2. Most notable were the strength deficits in the musculature of the right hip and right hip ROM deficits in several planes. Significant flexibility deficits were noted bilaterally in the piriformis, gluteus maximus, and hip adductor muscles, with the right being more restricted than the left. The patient's gait lacked hip extension on the right, with a short right antalgic stride, and a notable Trendelenburg pattern. After her initial evaluation and throughout treatment, the patient complained of significant right groin pain, especially with hip internal rotation, and pain at both the anterior and lateral aspects of the right knee with passive hip flexion, internal rotation, and external rotation.

Figure 1. Algorithm for evaluation of low back and hip pain. Reprinted with permission from Pract Neurol. Copyright 2008, BMJ Publishing Group.
Re-evaluation measurements were taken 4 to 6 weeks after the initial evaluation. The patient’s resting pain level at re-evaluation was 2/10, Oswestry Disability score was 20%, and Roland Morris score was 8 out of 24. She continued to have significant groin pain and only mild improvements in functional deficits. Table 2 lists changes in passive ROM measurements after 4 to 6 weeks of treatment. Hip passive ROM measurements remained limited in several planes, with an actual decrease in hip internal rotation. Changes in hip strength, as seen in Table 1, were minimal, with no changes in hip flexion, internal rotation, external rotation, or adduction. Her gait deficits remained unchanged.

### Diagnosis and Prognosis

According to the Guide to Physical Therapy Practice, the physical therapist diagnosis for this patient was within Pattern 4E and included impaired joint mobility, motor function, muscle performance, and range of motion associated with localized inflammation. At the time of initial evaluation, the patient’s prognosis was good for making significant functional gains in a reasonable length of time with skilled physical therapy intervention. Her goals were to use stairs without a handrail, ambulate community distances, put on shoes without difficulty, transfer from a low chair without difficulty, and sit for at least 60 minutes without discomfort. Over the 6-week treatment period, as objective and subjective measures improved minimally and the patient was unable to progress with exercises, it was clear that the prognosis with skilled physical therapy was no longer favorable and the patient required an additional work-up by a specialist before continuing care.

### Intervention

Following the patient’s lumbar laminectomy and fusion, her treatment consisted of lumbo-pelvic core stabilization exercises, soft tissue mobilization of the pelvic girdle musculature, lower extremity stretching, lower extremity strengthening with focus on hip musculature, postural education and awareness training, instruction in body mechanics, gait training, and range of motion exercises for the spine and hip. There was minimal exercise progression over the 6-week period due to the patient’s pain level and tolerance.

### Outcomes

Based on the patient’s symptoms and clinical examination, a differential diagnosis of hip intraarticular pathology was made by the physical therapist. The patient was referred to an orthopaedic hip specialist and was diagnosed with severe osteoarthritis of the right hip and scheduled to receive a hip arthroplasty with a lateral approach. The patient initiated physical therapy about 4 weeks after her hip replacement for rehabilitation according to a standard hip replacement protocol. At the initial physical therapy exam status post hip arthroplasty, the patient reported almost complete resolution of groin, thigh, and knee pain. Her initial Hip Condition Questionnaire score was 19 out of 50. This is a questionnaire used in some physical therapy settings to assess pain-related disability due to hip pain, and it has been found to have moderate to sufficient psychometric properties. The patient was discharged from physical therapy after two months of care. At that time, she had returned to work full time without limitations, was using stairs without compensations, and demonstrated a normal gait pattern without an assistive device. She continued to have some hip ROM and strength limitations post-hip arthroplasty but overall was making significant improvements. The patient reported a return to 95% of her prior function without pain and scored 3 out of 50 on the Hip Condition Questionnaire, indicating a significant improvement in overall function. Her home exercise program included continuation of her ROM exercises, gait and functional training, and strengthening exercises.

### DISCUSSION

This case demonstrates how findings of groin pain, decreased hip internal ROM, decreased hip strength, and gait deficits, which were present after a lumbar laminectomy and fusion, led to a diagnosis of intraarticular hip pathology and referral to a hip orthopaedic specialist. The groin region, a common pain referral area from intraarticular hip pathology, has been shown in various studies to be a key symptom of hip pathology. A retrospective analysis completed by Brown et al. on 97 patients with lower extremity pain revealed which signs and symptoms were the best predictors for primary sources of pain in the hip or spine. They found that patients with groin pain were 7 times more likely to have a hip disorder, or hip and spine disorder, rather than a spine disorder only. In another study, 113 patients with end-stage hip disease were evaluated for pain patterns prior to hip arthroplasty. The most common areas of pain before surgery included the groin,

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**Table 1. Manual Muscle Testing Measurements**

<table>
<thead>
<tr>
<th>Hip movement</th>
<th>Initial MMT right</th>
<th>Initial MMT left</th>
<th>Re-evaluation MMT right</th>
<th>Re-evaluation MMT left</th>
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<tbody>
<tr>
<td>Flexion</td>
<td>4/5</td>
<td>5/5</td>
<td>4/5</td>
<td>4/5</td>
</tr>
<tr>
<td>Extension</td>
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<td>5/5</td>
<td>5/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Abduction</td>
<td>4/5</td>
<td>4/5</td>
<td>4/5</td>
<td>4/5</td>
</tr>
<tr>
<td>Adduction</td>
<td>4/5</td>
<td>4/5</td>
<td>4/5</td>
<td>4/5</td>
</tr>
<tr>
<td>Internal rotation</td>
<td>4/5</td>
<td>5/5</td>
<td>4/5</td>
<td>4/5</td>
</tr>
<tr>
<td>External rotation</td>
<td>4/5</td>
<td>5/5</td>
<td>5/5</td>
<td>5/5</td>
</tr>
</tbody>
</table>

Abbreviation: MMT, manual muscle testing.

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**Table 2. Goniometric Measurements**

<table>
<thead>
<tr>
<th>Hip movement</th>
<th>PROM right</th>
<th>PROM left</th>
<th>Re-evaluation PROM right</th>
<th>Re-evaluation PROM left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion</td>
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<td>110°</td>
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<td>Extension</td>
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<td>Abduction</td>
<td>NT</td>
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<td>Adduction</td>
<td>NT</td>
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<td>NT</td>
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</tr>
<tr>
<td>Internal Rotation</td>
<td>25°</td>
<td>45°</td>
<td>20°</td>
<td>50°</td>
</tr>
<tr>
<td>External Rotation</td>
<td>25°</td>
<td>55°</td>
<td>40°</td>
<td>52°</td>
</tr>
</tbody>
</table>

Abbreviations: PROM, passive range of motion; NT, not tested.
anterior thigh, buttock, anterior knee, and greater trochanter. In the clinical guidelines for hip pain and mobility deficits for hip osteoarthritis, the Orthopaedic Section of the American Physical Therapy Association (APTA) recommended that key symptoms be present for diagnosis and classification of unilateral coxarthrosis or to identify the impairment-based category of hip pain and mobility deficits. One key symptom that should be present includes "moderate lateral or anterior hip pain during weight bearing." The patient presented in this case report fit this criterion as she experienced anterior pain in the groin region throughout her treatment.

Cibulka et al, in their review of guidelines for hip pain and mobility, stated that limited hip internal rotation by more than 15° when compared to the nonpainful side is a useful clinical finding that fits the unilateral coxarthrosis criterion. In the criteria for the classification of OA of the hip, the American College of Rheumatology also recognized decreased hip internal rotation as a key sign. Many studies have demonstrated that decreased hip internal rotation and painful internal rotation are key signs or clinical predictors in patients with hip OA or other hip intraarticular pathologies. Brown et al reported that patients with limited hip internal rotation were 14 times more likely to have a hip, or hip and spine disorder, rather than a spine disorder only. In an additional study, 195 patients over the age of 40 presenting with a new episode of hip pain were tested for radiological evidence of hip OA. Hip flexion, internal rotation, and external rotation were tested to identify which were most discriminatory of hip OA. Internal rotation limitations were found to be the most predictive of hip OA. The patient presented in this case study clearly had a significant decrease in hip internal rotation compared with the uninvolved side, and hip internal rotation was painful, reproducing her groin pain.

Another key finding that suggested intraarticular hip pathology in this patient was significant hip weakness in a non-myotomal pattern that did not significantly improve over the 6-week period of physical therapy. In addition, she had a painful gait with significant deficits, including a Trendelenburg pattern, which can indicate hip weakness. In a study by Rasch et al, 22 patients with known hip osteoarthritis who were scheduled for hip arthroplasty were tested for hip and knee strength. Hip extension, flexion, adduction, abduction, and knee extension strength of the involved limbs were reduced by 11% to 29% when compared to the uninvolved limbs. These scores were significant and confirmed muscular impairment, which likely led to functional losses such as decreased ambulatory capacity. In the study by Brown et al, patients with a limp were 7 times more likely to have hip, or hip or spine disorder, rather than spine disorder only. In Cibulka and Threlkeld’s case study, key findings in a patient with hip OA included significant hip weakness and gait deficits. Pain, as well as weakness, can lead to gait disturbances. The Orthopaedic Section, APTA, recognized pain with weight bearing in adults over the age of 50 as an important clinical indicator of significant hip OA. The patient presented in this case study had significant strength deficits of the hip, and gait abnormalities, including a painful limp and Trendelenburg pattern.

The patient’s evaluation and treatment notes, which were completed by a different physical therapist prior to her lumbar laminectomy and fusion, indicated that her main complaints were LBP and groin pain with standing and walking. Her hip ROM was significantly limited in several directions, especially internal rotation. She demonstrated significant right hip weakness in a non-myotomal pattern and had gait abnormalities. She also had a positive Flexion Abduction and External Rotation (FABER) test and hip scour test, both of which have been associated with hip pathology. Her MRI prior to back surgery demonstrated lumbar degenerative changes throughout with a 4 mm anterolisthesis of L4 on L5. According to the Evidence-based Clinical Guidelines for the Diagnosis and Treatment of Degenerative Lumbar Spondylolisthesis of the North American Spine Society, the majority of symptomatic patients with an absence of neurologic changes did well with conservative care. If this patient had initially been thoroughly evaluated with a comprehensive medical screen and differential diagnostic approach by a medical provider prior to her back surgery, her outcome may have been different, and she may have even been spared a costly back surgery.

The following are examples in the literature of patients who have been treated, and perhaps in some cases even over-treated, for back pathologies while overlooking coexisting hip pathologies. In a retrospective study that examined the prevalence of coexisting spine and hip disease using initial kidney, ureter, bladder (KUB) radiographs in patients who underwent spinal surgery, 388 patients were evaluated for hip pathology. Discernable hip pathology was found in 32.5% of the patients and most had a diagnosis of significant hip OA. In another study, a retro analysis was performed on 43 patients with hip OA. Twenty-four of the patients had been previously diagnosed with hip OA; however, 19 of them were treated solely for coexisting back pathologies without treatment for the hip. As previously stated, several studies have indicated the
high prevalence of LBP in patients with primary hip pathology.\textsuperscript{2,12,13} Low back pain was often found to resolve after treating the hip first.\textsuperscript{10,11} Differentiating signs and symptoms of low back pain from hip pathology can lead to early diagnosis and in turn, the avoidance of costly, unwarranted medical care.

CONCLUSION

This case report demonstrated the importance of screening and developing differential diagnoses in a physical therapy setting. Despite the specific diagnosis for referral, physical therapists should practice as autonomous providers and critically evaluate and perform a medical screen so they can inform physicians of additional issues when they arise. Published research has demonstrated that the key signs and symptoms of groin pain, decreased hip internal rotation, hip weakness, and gait dysfunction can be indicative of hip pathology. Further research is warranted to guide practitioners in developing additional criteria to distinguish between low back and hip pathologies.

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REFERENCES