

CASE REPORT

Clinical decision making in a patient with secondary hip-spine syndrome

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ABSTRACT

The prevalence of lumbar and hip pathology is on the rise; however, treatment outcomes have not improved, highlighting the difficulty in identifying and treating the correct impairments. The purpose of this case report is to describe the clinical decision making in the examination and treatment of an individual with secondary hip-spine syndrome. Our case study was a 62-year-old male with low back pain with concomitant right hip pain. His Oswestry Disability Index (ODI) was 18%, back numeric pain rating scale (NPRS) was 4/10, fear avoidance beliefs questionnaire (FABQ) work subscale was 0, FABQ physical activity subscale was 18, and patient specific functional scale (PSFS) was 7.33. Physical examination revealed findings consistent with secondary hip-spine syndrome. He was treated for four visits with joint mobilization/manipulation and strengthening exercises directed at the hip. At discharge, all standardized outcome measures achieved full resolution. Clinical decision making in the presence of lumbopelvic-hip pain is often difficult. Previous literature has shown that some patients with lumbopelvic-hip pain respond favorably to manual therapy and exercise targeting regions adjacent to the lumbar spine. The findings of this case report suggest that individuals with a primary complaint of LBP with hip impairments may benefit from interventions to reduce hip impairments.

INTRODUCTION AND BACKGROUND

Low back pain (LBP) and hip pain are common conditions managed by physical therapists. Clinical decision making in the presence of pathology in both regions can be challenging (Fogel and Esses, 2003), leading to inefficient care and increased costs (Offierski and McNab, 1983). Emerging research suggests that hip impairments may contribute to LBP (Offierski and McNab, 1983; Reiman, Weisbach, and Glynn, 2009). Identifying primary and secondary

impairments is critical in the development of an appropriate physical therapy plan (APTA, 2001; Offierski and McNab, 1983).

Offierski and McNab (1983) originally described coexisting lumbar spine and hip pathologies and labeled this condition hip-spine syndrome. The authors described four categories of hip-spine syndrome, including simple (primary), secondary, complex, and misdiagnosed. Simple hip-spine syndrome (HSS) occurs when pathological changes are present in both the lumbar spine and hip; however, the primary source of symptoms is clear. Secondary HSS is when the hip and spine pain are “interdependent” and the symptoms in one joint are “secondary” to a deformity or pathology in the other joint. Complex HSS was defined as a pathological change in each region that yields no clear primary source despite a careful physical examination.

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Typically, individuals classified with complex HSS undergo nerve root blocks or joint injections in an attempt to confirm the primary pain generator. Misdiagnosed HSS occurs when the primary source of symptoms is incorrectly diagnosed, leading to erroneous or inappropriate treatment and unnecessary cost to the individual and the health care system. These categories epitomize the inherent complexity of managing individual's with concurrent pathology. Traditionally, diagnostic imaging has been used to determine the pathoanatomic source of the symptoms, but this approach has produced suboptimal outcomes in the treatment of spinal disorders (Waddell, 2006). Dagenais, Garbedian, and Wai (2009) concluded that there is 1) a lack of consensus regarding the radiographic diagnosis of hip osteoarthritis and 2) no clear association between the presence of radiographic hip osteoarthritis and the indication for surgical management. In lieu of these deficiencies, the concept of regional interdependence has gained popularity in the physical therapy literature. Wainner, Whitman, Cleland, and Flynn, (2007) defined the term regional interdependence as "seemingly unrelated impairments in a remote anatomical region that may contribute to, or be associated with, the patient's primary complaint." The literature supports the validity of this concept in multiple regions of the body (Boyles et al, 2008; Cleland et al, 2007; Whitman et al, 2006). For example, intervention directed at the thoracic spine has been shown to be effective for shoulder pain (Boyles et al, 2008) and mechanical neck pain (Cleland et al, 2007). Manual therapy and exercise targeting the spine and lower extremities has been shown to be effective for patients with lumbar spinal stenosis (Whitman et al, 2006).

Given the anatomic proximity and shared soft tissue connections, an interaction between the lumbar spine and hip joint seems biologically plausible. Hip range of motion (ROM) measurements have been implicated in studies with interventions targeting the lumbar spine (Flynn et al, 2002; Hicks, Fritz, Delitto, and McGill, 2005). A study examining the hip ROM in subjects with LBP and/or sacroiliac dysfunction showed asymmetries in bilateral hip internal rotation (Cibulka, Sinacore, Cromer, and Delitto, 1998). Although some radiographic studies looking at patients with LBP and hip complaints have failed to show a clear connection between the two regions (Matsuyama, Hasegawa, and Yoshihara, 2004; Yoshimoto, Sato, and Masuda, 2005), Ben-Galim, Ben-Galim, and Rand (2007) reported on 25 patients with pain and impairments in both regions who had significant reductions in LBP and disability scores following total hip arthroplasty. Reiman, Weisbach, and Glynn (2009) provide a detailed overview of the evidence supporting the potential interactions between the lumbar spine and hip joint.

Despite an apparent connection between the lumbar spine and the hips, there is limited evidence to guide the therapist in selecting the region to initiate treatment. The purpose of this case report is to describe the clinical decision making in the examination and treatment of an individual with secondary hip-spine syndrome.

CASE DESCRIPTION

History

A 62-year-old male, employed as a claims supervisor, was referred to physical therapy with a chief presenting complaint of right-sided LBP with concomitant right hip pain. He had no previous injury to his lumbar spine or lower extremities, and denied any significant medical history. No red flags were identified during the systems review and physical examination/symptom investigation. The individual reported that his symptoms began approximately 5 and a half months prior, following a weight-training session for his lower extremities. He was performing an inverted leg press exercise when he felt the initial onset of right-sided LBP with an aching sensation along the right lateral hip region. Following the onset of this pain, he discontinued his lower extremity weight-training sessions for 2 weeks. His symptoms progressed until he was unable to drive for greater than 60 minutes and had lumbar discomfort while sitting at work. Two weeks after initial onset, he sought medical treatment from his primary care physician and was initially managed with a nonsteroidal anti-inflammatory drug (NSAID) and rest. After 4 weeks with no improvement in his symptoms, he returned to his physician and was referred to an orthopedic surgeon. The orthopedic surgeon ordered magnetic resonance imaging (MRI) of the right thigh to rule out a suspected femoral stress fracture due to his high level of activity. The MRI results were unremarkable except for age-related degenerative changes in the hip joint. He was then referred to a physiatrist for further medical management. The physiatrist referred him to physical therapy for evaluation for symptoms of a musculoskeletal origin with a referral for "LBP Evaluate and Treat." The subject in this case gave consent to use his medical information and images as part of this publication.

Five and a half months after the initial injury, he presented to physical therapy with the following baseline outcome measurements: Oswestry Disability Index (ODI) of 18%; average Numeric Pain Rating Scale (NPRS) of 4/10 in the lumbopelvic-hip region; Fear Avoidance Beliefs Questionnaire (FABQ) work subscale score of 0; FABQ physical activity subscale

score of 18; a Lower Extremity Functional Scale (LEFS) score of 74/80; and a Patient Specific Functional Scale (PSFS) score of 7.33. The three activities he reported as problems on the PSFS included 1) running, 2) lower extremity weight training, and 3) sitting greater than 60 minutes. Table 1 provides a brief description of each outcome measure, including their respective psychometric properties. Additional functional limitations included squatting, crossing his right leg over his left, ascending stairs, and driving. He also reported an intermittent aching sensation in the right calf that extended into his first and second toes typically associated with driving and prolonged sitting. These symptoms were infrequent and resolved in less than 24 hours. Finally, he reported mild morning stiffness in the back and hip region that lasted less than 30 minutes. The patient made it clear that he was distressed about his inability to maintain his exercise regimen due to his pain and that he was anxious to return to activity. Prior to the incident, he was participating in weight training, racquetball, and running five to six times per week. His main goal was to return to his previous exercise regimen. At the time, he was working full-time with a majority of his day spent in a seated position.

Tests and measures

The physical examination began with observation and postural screening in standing, sitting, and supine as

described by Kendall, McCreary, and Provance (1993). Remarkable findings included decreased lumbar lordosis and increased thoracic kyphosis. Range of motion (ROM) was assessed by using a bubble inclinometer (Fritz, Piva, and Childs, 2005) and revealed hip and lumbar ROM impairments. Lumbar ROM was limited to 42° flexion and 18° extension with increased LBP with each movement. Prone hip internal rotation (IR) was limited to 18° on the right and produced concordant lumbar spine pain and right hip pain at end range. In this case, concordant symptom reproduction is defined as reproduction of the “exact” symptoms for which the individual was seeking treatment. Manual muscle testing revealed normal strength in the lower extremities with the exception of the gluteus maximus and gluteus medius on the right, which were graded as 4+/5 on the right (Kendall, McCreary, and Provance, 1993). Resisted testing of the gluteus maximus and medius also increased his LBP symptoms. The results of the ROM and strength testing are outlined in Table 2.

He did not demonstrate a directional preference for lumbar flexion or extension (Browder, Childs, Cleland, and Fritz 2007). Abdominal strength was normal (Kendall, McCreary, and Provance, 1993). Popliteal angle was limited bilaterally to 65 degrees in the supine 90 degree hip flexed position. Slump testing and straight leg raise testing were negative for symptom reproduction and ROM asymmetry. No abnormalities were noted in the lower extremities for

TABLE 1 Description and psychometric properties of outcome measures

Outcome measure	Description	Reliability	Minimum detectable change and minimal clinical important difference
Modified Oswestry Disability Index	10 question condition-specific measurement for individuals with LBP. Involves questions relating to pain and functional limitations.	ICC = 0.90 (Fritz & Irrgang, 2001)	MDC = 4–10 pts (Tacci, Webster, Hashemi, & Christiani, 1999) MCID = 6 pts or 12% (Cleland & Netter, 2005; Fritz & Irrgang, 2001)
Patient Specific Functional Scale	A patient-centered questionnaire in which the patient writes his or her own limitations due to the condition.	0.82–0.97 (Chatman, Hyams, & Neel, 1997; Grotle, Brox, & Vollestad, 2006; Tacci, Webster, Hashemi, & Christiani, 1999; Whitman et al, 2006)	MCID 2.0 (Cleland, Fritz, & Whitman, 2006) MDC = 1.88–3.00 (Cleland, Fritz, & Whitman, 2006; Fritz & Irrgang, 2001)
Fear Avoidance Beliefs Questionnaire	Questionnaire designed to assess beliefs regarding movement and its effects on LBP. Two subscales: work and physical activity.	0.77 (back pain) (Cleland, Childs, & Whitman, 2008)	MDC (Grotle et al, 2006) Work = 12 pts Physical Activity = 9 pts
Numeric Pain Rating Scale	11-point scale asking the individual to rate his or her pain level based on severity.	0.76 (Cleland, Childs, & Whitman, 2008)	MCID = 2 pts (Childs, Pica, & Fritz, 2005; Cleland, Childs, & Whitman, 2008; Grotle, Brox, & Vollestad, 2006)
Global Rating of Change	Retrospective 15-point scale asking the individual to rate their perceived level of change (+ or -)	Not reported	±6 or 7=large changes (Jaeschke, Singer, & Guyatt, 1989) ±4 or 5=moderate (Jaeschke, Singer, & Guyatt, 1989)±1 to 3=small (Jaeschke, Singer, & Guyatt, 1989)

TABLE 2 Significant examination findings

	Right	Left
Gluteus Maximus	4+/5*	5/5
Gluteus Medius	4+/5*	5/5
Hip External Rotation (prone; passive)	33°	31°
Hip Internal Rotation (prone; passive)	18°***	27°
Hip Extension (sidelying; passive)	0°	6°
Hip Flexion (supine; passive)	108°	110°
Ober's Test	+	-
Hip Quadrant	+**	-
FABER	+**	-
Lumbar Flexion	42°*	
Lumbar Extension	18°*	

*Denotes nonconcordant production of low back pain.

**Denotes nonconcordant production of hip pain.

***Denotes concordant symptom reproduction.

sensation, muscle stretch reflexes, or pathological reflexes.

Posterior to anterior passive mobility assessment of the thoracic and lumbar spine was unremarkable for symptom reproduction, however, all segments were deemed to be hypomobile (Maher, Latimer, and Adams, 1998; Maitland, 1986; Maitland, 1991). Posterior to anterior passive mobility testing (Maitland, 1991) of the hip was deemed to be hypomobile in inferior and anterior glides with a firm end-feel, but these motions did not reproduce symptoms. Supine anterior-posterior hip accessory motion testing reproduced his concordant* symptoms. Palpation of the soft tissue structures in the spine and hip regions did not reveal any focal tender points. Ober's test was positive for ilio-tibial band shortness. Nonconcordant hip pain was produced with the hip quadrant and FABER tests. In this case, nonconcordant symptom reproduction is defined as reproduction of symptoms not associated with a patient's primary complaint and/or a therapist identified physical impairment (i.e., impairments in joint mobility or ROM). Mechanical testing of the sacroiliac joint, soft tissue and neural structures of the lower extremity were not provocative. See Table 3 for description and psychometric properties of special tests performed with this patient.

Diagnosis

The first step in the clinical decision-making process is to determine if the patient is an appropriate candidate for physical therapy services. Delitto, Erhard, and Bowling (1995) in their treatment-based classification (TBC) system, outlined this initial step in the patient-

therapist interaction. Three options are described, including 1) patient is appropriate to be managed by physical therapy, 2) patient is appropriate for physical therapy but may require consultation by other health care provider, and 3) patient is not appropriate for physical therapy and needs to be referred to appropriate healthcare provider (Delitto, Erhard, and Bowling, 1995). The clinician determined that no red flags were present that would necessitate referral, and the patient did not present with any signs/symptoms that would require further consultation (Delitto, Erhard, and Bowling, 1995). Although the FABQ physical activity subscale score of 18 may warrant consideration for consultation due to elevated fear avoidance beliefs, in the absence of additional psychosocial yellow flags, the clinician opted to initiate treatment without referring to another health care provider (Delitto, Erhard, and Bowling, 1995).

After determining that the individual was appropriate for physical therapy management, the second step in a classification-based approach is to place the individual into a stage, based on functional limitations and symptom severity (Delitto, Erhard, and Bowling, 1995). Stage I includes those patients with higher ODI scores who are unable to perform basic mechanical functions (i.e., sit >30 min, stand >15 min, and walk >¼ mile). Stage II includes those patients who are able to perform basic activities adequately but are unable to perform more functional activities. Stage III includes patients who are unable to perform demanding or sustained activities. The clinician determined that this individual was best suited to the stage II of the TBC because his ODI was on the border of Stage II and III and he was able to perform basic activities but had difficulty with more functional activities. Treatment goals for patients in stage II include reducing disability, correcting physical impairments, and improving the patient's ability to perform complex (functional) tasks. The clinician opted to use a response-driven, impairment-based approach to treatment.

In a response-driven, impairment-based approach, the clinician looks for movements, positions, or impairments that reproduce a patient's concordant symptoms. Concordant symptom reproduction was achieved with prone passive right hip internal rotation and anterior-posterior passive accessory motion of the right hip (Appendix A). It is unlikely that these tests isolate movement at the hip joint, but care was taken by the clinician to minimize lumbar spine movement while performing these tests/measures. During prone passive hip IR, the pelvis was stabilized via manual pressure directed in a posterior to anterior direction over the sacrum and contralateral ilium. Anterior-posterior passive accessory motion of the right hip was performed in a position of hip and knee flexion, hip

TABLE 3 Description and psychometric properties of tests/measures performed

Test/Measure	Description	Reliability
Range of Motion (ROM)	Lumbar ROM using single inclinometer Hip ROM using standard goniometer	ICC = 0.60–0.61 (Fritz, Piva, & Childs, 2005) ICC = 0.58–0.94 (Holm et al, 2000)
Manual Muscle Testing	Gratation of strength using manual resistance	Inter-examiner ICC = 0.82–0.97 (Cuthbert & Goodheart, 2007)
Deep Tendon Reflexes	Using single reflex hammer	Intra-examiner ICC = 0.68–0.91 (Litvan et al, 1996) Inter-examiner ICC = 0.50–0.64 (Litvan et al, 1996)
Sensory Testing	Identification of sensation differences.	Not reported
Posterior-Anterior Segmental Mobility Testing	Patient in prone. Examiner exerts a posterior-to-anterior force through the lumbar vertebrae. Assessment for mobility, end-feel and symptoms.	ICC = 0.55–0.72 (Maher, Latimer, & Adams, 1998)
Ober's Test	Patient sidelying. On the side being examined the knee is flexed to 90° and is abducted/extended until it is in line with the trunk. The examiner guides the extremity as gravity adducts the hip. Positive test result includes asymmetry in adduction ROM of greater than 10°.	Intra-examiner 0.90 (Reese & Bandy, 2003)
FABER (Flexion/Abduction/External Rotation)	Begin with patient in sidelying. Place LE in hip flexion/abducted with the ipsilateral foot resting on the opposite knee (Figure 4). Stabilize the contralateral ASIS and apply an ER and posterior force on the ipsilateral knee. Positive test result for SI dysfunction includes symptom/pain reproduction over the ipsilateral SI region. Positive test result for hip pathology includes symptom/pain reproduction over the anterior hip or groin region (Troelsen et al, 2009).	K = 0.60–0.96 (Cliborne et al, 2004; Kokmeyer, van der Wuff, Aufdemkampe, and Fickenscher et al, 2002; Martin & Sekiya, 2008)
FAIR (Piriformis) Test	Begin with the patient in sidelying with the test LE being upward. Passively flex, adduct and IR the tested LE. Positive test result includes pain/symptom reproduction.	Not reported
Gaenslen's Test	Begin with patient in supine. Test LE is brought into full hip and knee flexion. The opposite LE stays in extension. Pressure is applied to the flexed extremity. Positive test result includes reproduction of pain/symptom over the SI region.	Inter-examiner K = 0.54–0.76 (Cliborne et al, 2004; Laslett & Williams, 2004; Martin & Sekiya, 2008)
Thigh Thrust	Begin with patient in supine. Examiner passively flexes and adducts the hip to 90°. A long-axis compressive force is applied through the femur. Can repeat in varying angles of adduction/abduction. Positive test result includes pain/symptom reproduction over the ipsilateral SI region.	Inter-examiner K = 0.67–0.88 (Cliborne et al, 2004; Laslett & Williams, 2004; Martin & Sekiya, 2008)
Sacral Thrust	Begin with patient in prone. Examine applies a thrust in the anterior direction over the sacrum. Positive test result includes pain/symptom reproduction over the involved SI region.	Inter-examiner K = 0.41–0.56 (Cliborne et al, 2004; Laslett & Williams, 2004; Martin & Sekiya, 2008)
Compression Test	Begin with patient in sidelying. Examiner applies compressive force over the iliac crest directed toward the opposite iliac crest. Positive test result includes pain/symptom reproduction over involved SI region.	Inter-examiner K = 0.26–0.73 (Cliborne et al, 2004; Laslett & Williams, 2004; Martin & Sekiya, 2008)
Distraction Test	Begin with patient in supine. Apply pressure to both ASIS in a posterolateral direction. Positive test result includes pain/symptom reproduction over involved SI region.	Inter-examiner K = 0.26–0.69 (Cliborne et al, 2004; Laslett & Williams, 2004; Martin & Sekiya, 2008)
IR-Flexion-Axial Compression	Begin with patient in supine. Passively flex and IR the hip. Apply an axial compressive load through the femur. Positive test result includes pain/symptom reproduction in the groin region.	Not reported
Anterior Labral Tear Test	Patient supine, take hip into full flexion, external rotation and full abduction. Extend the hip combined with medial rotation and adduction. Positive test result includes groin pain reproduction.	Not reported
Posterior Labral Tear Test	Patient supine, take hip into full flexion, adduction and internal rotation. Extend the hip with combined abduction and external rotation. Positive test result includes groin/hip pain reproduction.	Not reported

adduction and slight hip IR, and care was taken to not introduce movement of the lumbar spine and pelvis. Nonconcordant symptom reproduction was achieved with strength testing of gluteus medius and maximus, active lumbar flexion and extension, hip quadrant and FABER tests. Additional nonconcordant findings included lumbar and hip joint hypomobility. Table 2 outlines the impairments found in the physical examination. The concurrent and apparently interrelated hip and spine impairments suggest a secondary hip-spine syndrome, in which the primary complaint of LBP is considered secondary to concurrent pathology in the hip. Given this information, initial physical therapy interventions were targeted at the hip joint.

Prognosis

The initial prognosis was guarded due to the persistent nature of his symptoms and previous recalcitrance to rest, self-management, and previous medical care. The clinician was optimistic that physical therapy interventions directed at hips would result in a successful outcome as this patient had never received treatment directed at the hip joints.

Intervention

The clinician utilized a combination of manual therapy and therapeutic exercises directed at the hip. The manual therapy techniques included thrust and non-thrust long axis distraction manipulation of the right hip, supine anterior-posterior nonthrust mobilization, and prone posterior-anterior nonthrust mobilization in flexion, abduction, and external rotation (Appendix A). Nonthrust mobilizations were performed for three bouts of 30 repetitions on the right side at a grade III or IV, as described by Maitland (Maitland, 1986; Maitland, 1991). The selected thrust and nonthrust manipulations were utilized in this case to address the hypomobility of the hip joint identified in the physical examination.

The patient was instructed in a home exercise program and was required to demonstrate competence at subsequent visits (Appendix B). His therapeutic exercise regimen consisted of: stretching exercises for the piriformis and hamstrings; self-mobilization techniques directed at the postero-inferior hip capsule; and strengthening exercises for hip extension and sidelying hip abduction/external rotation. The supine piriformis stretch was prescribed on the basis of the reduction of symptoms rather than the presence of muscle shortness. The stretching was prescribed for 20–30 seconds holds and repeated two tor three times

(Decoster, Cleland, Altieri, and Russell, 2005). The self-mobilization techniques were performed for two to three bouts of 30 repetitions (Maitland, 1991). The hip extension and sidelying hip abduction/external rotation exercises were prescribed to be performed for 15–20 repetitions (Mascal, Landel, and Powers 2003). The exercises listed above were selected to address the impairments of joint mobility and muscle performance identified at the hip in the physical examination.

The episode of care consisted of one session per week for 3 weeks and then a final session at the 5th week, for a total of four visits. His home exercise program was to be performed two times per day. Phone follow-ups regarding current symptoms and functional status were performed at 3 months and 6 months after last treatment session. Written outcome measures were obtained via facsimile at the same time points.

Outcomes

Outcome measures were collected at the first, third, and fourth visits as well as follow-up sessions at 3 months and 6 months. By the third visit, the patient had an ODI of 0%, an average NPRS 0/10, FABQ work and physical activity subscales scores of 0, PSFS score of 10, and an LEFS score 80/80. In addition, a global rating of change score of +7 was obtained, indicating a large shift in perceived recovery. See Table 1 for psychometric properties of all standardized outcome assessments. All outcomes remained unchanged at the 3- and 6-month follow-up. More importantly, his functional limitations of squatting, crossing his right leg over his left, ascending stairs, running and lower extremity weight lifting, and driving/sitting for longer than 1 hour had all resolved. He was able to participate without limitation in his activities of daily living, as well as all his occupational and recreational activities. The results are highlighted in Table 4.

TABLE 4 Outcome measure values throughout course of treatment

	Initial visit	3rd visit	Discharge (4th visit)	3 Month	6 Month
ODI	18%	0%	0%	0%	0%
Avg. NPRS	4/10	0/10	0/10	0/10	0/10
PSFS	7.33	10	10	10	10
FABQ-W	0	0	0	0	0
FABQ-PA	18	0	0	0	0
GROC	n/a	7	7	7	7

DISCUSSION

The clinical decision-making process in patients with concurrent impairments in the lumbar spine and hip can be complex, and the evidence describing the interaction between the lumbar spine and hip joint is limited. With the exception of lumbar spinal stenosis (Whitman et al, 2006), the hip is rarely treated in patients with LBP. The hip joint has been implicated in studies identifying predictor variables of patients who will respond to specific lumbar interventions (Browder, Childs, Cleland, and Fritz, 2007; Flynn et al, 2002). There is also low level evidence suggesting potential relationships between LBP and hip strength (Nadler, Malanga, and Feinberg, 2001) and hip ROM (Cibulka, Sinacore, Cromer, and Delitto, 1998). Although the direct relationship between the hip and lumbar spine is unknown, there is an apparent interaction between the two regions.

Given this unclear relationship, the focus of this case report was to describe the clinical decision-making process taken in the presence of concurrent impairments of the hip joint and lumbar spine. The concept of regional interdependence, which has some face validity based on previous research, was considered important in this patient. In this case, examination of regions surrounding the area of primary complaint afforded the clinician the opportunity to reproduce the concordant symptoms with tests directed at the hip joint. This allowed for the appropriate categorization of this individual as having a secondary hip-spine syndrome. In secondary hip-spine syndrome, the hip is deemed to be the primary contributor to a patient's LBP. Concordant symptom reproduction was critical in this case to allow for appropriate clinical decision making and initial intervention. Had the clinician not implemented a regional interdependence approach and reproduced the concordant symptoms, there is a possibility that inappropriate interventions may have been implemented, resulting in increased health care costs and prolonged disability. Finally, the treatment-based classification for LBP allowed the clinician to systematically triage and stage the patient in an efficient and effective manner.

Previous literature has shown that individuals with lumbar spinal stenosis may respond favorably to mobilization of regions remote to the lumbar spine, including the hips. The findings of this case report suggest that some individuals with a primary complaint of LBP may benefit from manual therapy and exercise targeted at the hip. In this case, it is likely that the primary contributor to the clinical presentation was the hip joint despite a primary complaint of LBP. Proper identification of the region that is

primarily responsible for symptom production may have resulted in faster recovery for this individual. We would argue that the successful outcome was achieved because of interventions being applied to the correct, symptom-provoking region.

CONCLUSION

Appropriate clinical decision making in cases that have concurrent lumbar and hip pathology is often challenging. Concordant symptom reproduction using a response-driven, impairment-based approach may allow clinicians to correctly identify the symptom-generating region and deliver effective interventions to reduce pain and disability. Finally, utilizing the concept of regional interdependence, clinicians may improve the likelihood that they correctly identify impairments that are causing or contributing to a patient's symptoms.

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Appendix A. Manual therapy interventions.

Long-axis Distraction Manipulation

(High-velocity, end-range, longitudinal traction force to the lower extremity on the acetabulum in supine with the hip in slight flexion, abduction and varying degrees of internal and external rotation of the lower extremity)



- Grasp the patient's ankle proximal to the malleoli with both hands in a grip comfortable for the patient 5
- Raise the leg to approximately 10–30° of hip flexion and 15–30° of abduction, slight external rotation 10
- Gently distract the hip and perform oscillations 15
- Once the hip is felt to relax, apply a high velocity, small amplitude thrust 20

Anterior-posterior Hip Mobilization Progression

(Low-velocity, mid end-range, anteromedial to posterolateral oscillatory force to the femur in a supine position, with hip flexion, adduction and external rotation)



- Position the lower extremity with the hip in a position of flexion, adduction and internal rotation 30
- Use your body to impart an oscillatory, passive mobilizing force directed at the postero-lateral hip capsule through the long axis of the femur 35
- Progress the technique by adding more flexion, adduction and/or internal rotation

Posterior-Anterior Mobilization in Flexion, Abduction, External Rotation

40

(Low velocity, end-range, posterior to anterior oscillatory force to the proximal femur in a prone position, with hip flexion, abduction and external rotation).



- Place the patient in prone
- Bring the hip into varying degrees of flexion, abduction and external rotation
- Contact the proximal hip and use your body to impart an oscillatory, passive mobilizing force in a posterior to anterior direction
- Vary the vector of your mobilizing force dependent on the patient's symptoms and joint stiffness
- If extremely stiff, start with a pillow under the patient's left trunk to decrease the amount of hip abduction required. Progress to lying flat on the table when it is tolerated by the patient.

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Appendix B. Specific home exercise program.

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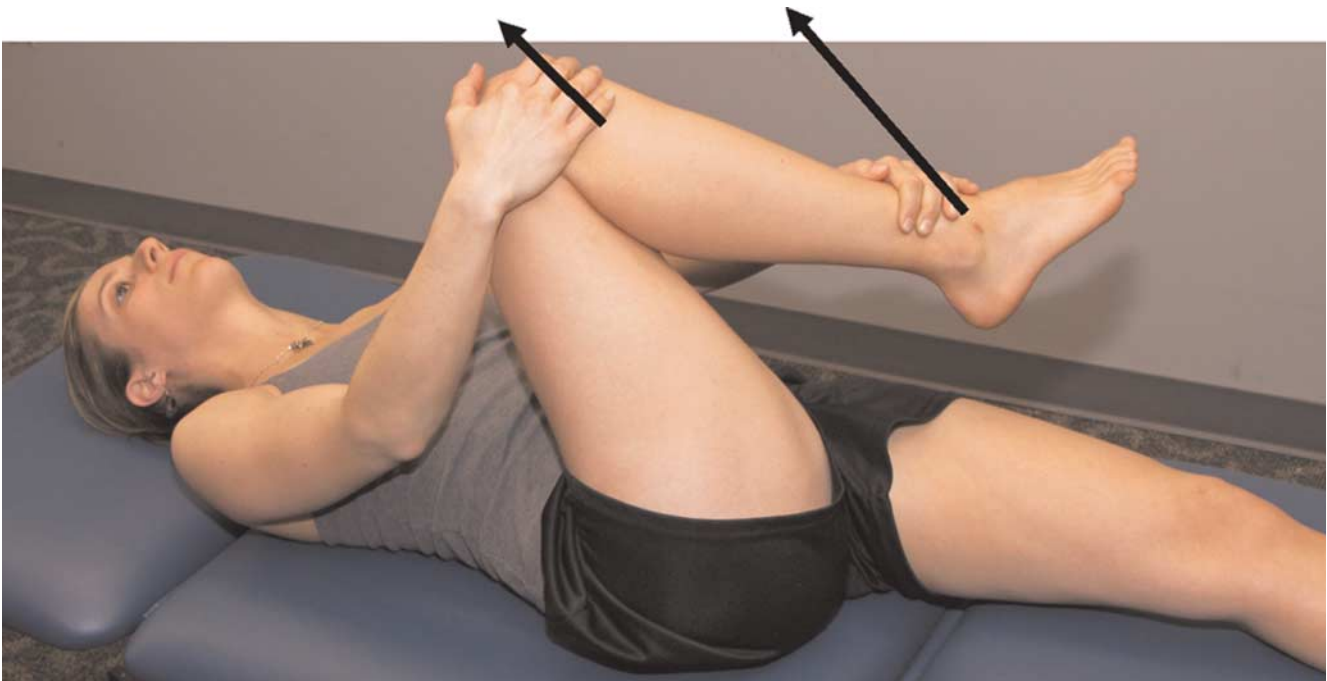
SUPINE PIRIFORMIS STRETCH

Grasp your right leg with your hands.

Bring your right leg up toward your left shoulder. You should feel a stretch in your right buttocks.

Hold this stretch for ____ seconds and repeat ____ times.

70



Self Mobilizations of the Hip Joint

- Place ankle on a chair.
- Place both hands in the crease of the groin.
- Use hands to apply a force into the hip joint that is directed toward the floor.
- Vary your angle of force to find the area with most stiffness.
- Repeat 30 times for 2–3 bouts.

75

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HAMSTRING STRETCH

Place a towel roll under your lower back. Tighten the muscles of your left leg to keep it straight and on the ground.

Grasp the lower right thigh with both hands and bring it up until it is perpendicular to your body (straight up). Keep your elbows straight and straighten your leg until you feel a stretch behind your right thigh.

Hold for _____ seconds and repeat _____ times.

Note: You should not feel lower back pain or pain in the calf with this exercise.



PRONE HIP EXTENSION

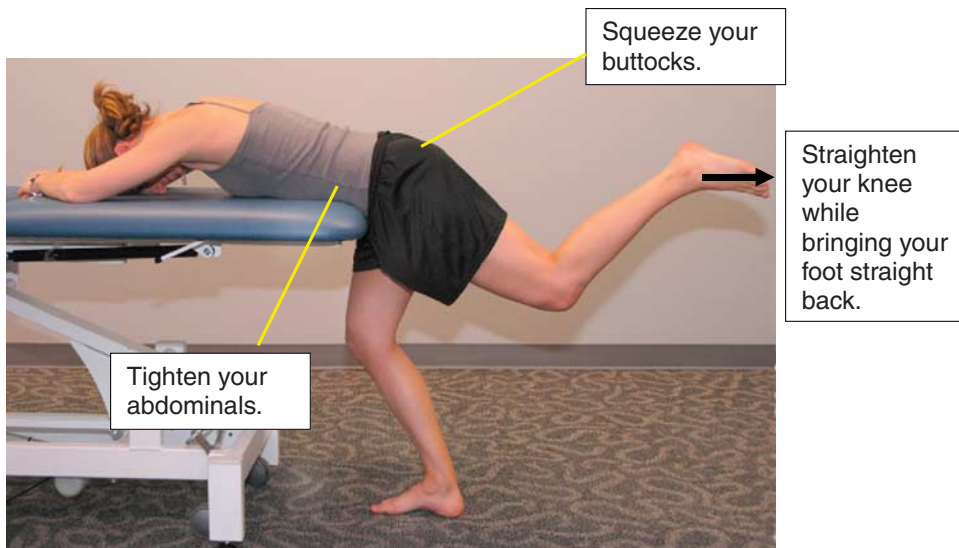
Lay on your stomach at the end of a table with your left foot on the floor.

95

Tighten your deep abdominal muscles and hold a “neutral” pelvis position. Lift and straighten your right leg as though you were to kick someone positioned straight behind you.

Ensure that the motion is all coming from your hip and leg. Do not allow your lower back or upper body to move. Do not lose the “neutral” pelvis position.

100



“THE CLAM” HIP ABDUCTION/EXTERNAL ROTATION IN SIDE LYING

Lay on your right side. Your shoulders, trunk, and hips should remain stationary and perpendicular to the floor throughout this exercise.

105

Keep your knees together and lift your top knee toward the ceiling.

DO NOT let the pelvis roll backward. Concentrate on having all of the motion come from the left hip.

NOTE: If you have difficulty keeping the pelvis and trunk from rolling backward, start the exercise with your back, buttocks, and feet up against a wall. As you get stronger, move away from the wall.

110

Perform this exercise _____ times per session, _____ sessions per day.



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