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Management of a female with chronic sciatica and low back pain: A case report

Kyndall L. Boyle, PT, PhD, OCS[1] and Jennifer Rask Demske, DPT[2]
[1]*Assistant Professor, Elon University, Elon, NC, USA*
[2]*Bodies in Motion Physical Therapy, Falls Church, VA, USA*

This case report describes therapeutic exercise management for a female with a chief complaint of right sciatica and secondary low back pain (LBP). The patient was a 61-year old female with chronic right sciatica and LBP. At initial examination she reported pain at 9 on a scale of 10, with 10 being the most severe, demonstrated a straight leg raise (SLR) limited to 45°, and a positive Ober's test. The Oswestry Disability Index (ODI) was 40%. The first six weeks (five visits) the patient was instructed in stabilization and spinal flexion exercises. After noting limited improvement, the intervention plan was revised for 13 additional weeks (10 visits) to include the following exercises to reposition and stabilize the pelvis: muscle activation of the left hamstrings, adductors, gluteus medius, abdominals, and right gluteus maximus; stretching the left posterior hip capsule; and muscle inhibition for the paraspinals. After five visits (six weeks), the patient reported 6/10 pain and leg pain. At discharge, patient reported 0/10 pain. SLR was 70°, the Ober's test was negative, and the Oswestry Disability Index was 0%. Stabilization and flexion exercises resulted in limited outcomes and did not eliminate the right sciatica symptoms. The addition of muscle activation, muscle inhibition, and a left hip capsule flexibility exercises resulted in remarkable outcomes and appears to be beneficial for eliminating pain and improving function for this woman with chronic right sciatica/LBP.

Introduction

Sciatica is defined as "pain radiating down the leg/s below the knee along the distribution of the sciatic nerve; usually related to mechanical pressure and/or inflammation of lumbosacral nerve roots" (Agency for Health Care Policy and Research, 1994). The incidence of sciatica has been reported between 2% and 40% (Bronfort et al, 2000). Causes of sciatica have been attributed to herniated lumbar discs (Carette et al, 1997; Vroomen, deKrom, Slofstra, and Knottnerus, 2000), entrapment by the piriformis muscle (Abitbol, 2007), compression by the inferior gluteal artery as a result of an anomaly (Merlo et al, 1997), direct trauma to the buttock, and occupational postures/movements. Interventions have been described for sciatica in general and are not described differently for right- vs. left-sided sciatica. If a patient's sciatica is associated with an asymmetrical postural pattern such as a right handed pattern (Kendall et al, 2005) or a left anterior interior chain pattern (Boyle, 2006), then specific interventions to address unilateral impairments may be important. In the past, interventions for sciatica have included patient education for bed rest; however bed rest does not appear to have any benefit over staying active (Hagen, Hilde, Jamtvedt, and Winnem, 2007; Hagen, Jamtvedt, Gunvor, and Winnem, 2005). Injections have short-term pain relief after one, but no reported benefit after two or three injections (Price et al, 2003). Additional interventions for

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Address correspondence to Kyndall L. Boyle, PT, PhD, OCS, Elon University, DPTE CB2085, Elon, NC 2724, USA. E-mail: Kyndall.Boyle@nau.edu

sciatica have included mechanical modalities such as traction (Clarke et al, 2007), joint mobilization, joint manipulation, electrotherapeutic modalities, physical agents, functional training, and exercise (APTA 1997; Riddle and Jewell, 2005). The optimum exercises for acute and chronic sciatica (with and without disc herniation) are unknown, and more research is needed (Durrani and Winnie, 1991; Riddle and Jewell, 2005; Wheeler, 1995). The purpose of this case report is to describe physical therapy management for a patient with a primary complaint of chronic right sciatica (leg pain) and a secondary complaint of chronic low back pain (LBP).

The aim of this case report is to describe seven exercises prescribed for the patient that were developed by the Postural Restoration Institute™ to manage a common postural pattern of asymmetry. This management program has not been previously discussed in the literature.

Case description

The patient was a 61-year-old female referred by a neurologist with a diagnosis of right leg symptoms and low back pain. The patient stated that her right leg symptoms began a year ago with pain radiating into the right posterior hip and down the right posterolateral leg and lateral foot of unknown etiology. She stated she had constant and chronic LBP for 20 years where she sought repeated visits to a chiropractor and acupuncturist with limited results. The patient had received these treatments approximately one year prior to initiating physical therapy. The patient was asked to rate her pain on a numerical pain scale as described by O'Sullivan and Schmitz (2001). This test quantifies the intensity of pain with a 0 representing no pain and 10 representing the worst pain imaginable. She rated her constant pain 9/10 at its worst and 2/10 at its best. Aggravating activities included lifting, walking in the grocery store, and falling asleep in a recliner. Easing activities included sitting down when in pain from walking. The patient was taking Celebrex (NSAID), Skelaxin (muscle relaxer), Effexor (antidepressant), and Detrol (for overactive bladder/incontinence). An MRI done two weeks prior to the initiation of her physical therapy showed multilevel disc degeneration at L3–L5 and moderate lumbar stenosis at L3–L5 secondary to an annular bulge and facet hypertrophy.

Tests and measures

Standing lumbar flexion and extension range of motion were within normal limits (WNL), except extension was painful. Repeated extension in standing increased the patient's symptoms. Side glide to the right was WNL and decreased slightly to the left and was pain free bilaterally. Passive hip rotation range of motion was measured as described by Norkin and White (1995). Passive internal rotation (IR) of the right hip was 46° and left hip IR was 34°. Bilateral L1-L5 dermatomes were WNL for light touch and myotomes were WNL for motor function (Magee, 1997). A straight leg raise (SLR) was performed to assess hamstring flexibility and neural tension (Magee, 1997). The patient reported pain in the right foot with a right SLR of 45° and a stretch in the left posterior thigh with a left SLR at 60°. The patient's posterior superior iliac spine (PSIS) was high on the left (Dutton, 2004).

The left Ober's test was positive and the right Ober's test was negative. The Ober's test is traditionally used to assess tensor fascia latae and iliotibial band flexibility (Kendall and McCreary, 1983; Kendall et al, 2005). The Ober's test, however, has more recently been used to reflect pelvic position (the relative position of the femoral head in the acetabulum), which if not in neutral (e.g., a pelvis in an anteriorly tilted or hip flexed position) may not allow for the femur to fully adduct on the acetabulum (Boyle, 2005, 2006; Boyle, Jansa, Lauseng, and Lewis, 2003; Inverse, 1999; Jansa, 1999; Janssen and Boyle, 2004). There is no known literature reporting on sensitivity and specificity for the Ober's test. The patient reported moderate to severe tenderness to palpation over the right buttock (piriformis region) and moderate tenderness over bilateral PSISs. The patient's Oswestry Disability Index (ODI) score was 40%, which is considered moderate disability (Fairbank and Pynsent, 2000).

Diagnosis and prognosis

This 61-year-old female presented with right sciatica (pain down her right buttock into her lateral right foot) and chronic low back pain. The prognosis for her at the time of the initial examination was to improve to a 20% on the ODI. The plan of care was to have the patient be

seen twice a week for 10 weeks for instruction and progression in a home exercise program until her goals were met and/or no further improvements could be made.

Intervention

Stabilization exercises

Visits 1–5

The patient was instructed in a home exercise program of lumbar stabilization exercises to include: transversus abdominis strengthening, posterior pelvic tilts, bridging, and marching with abdominal bracing (Hodges, 1999; Hodges and Saunders, 2001; Sahrmann, 2002). She was also instructed in single and double knee to chest stretches for lumbar flexion (Kisner and Colby, 2002). The patient was educated on body mechanics, lifting techniques, and postural awareness. Following implementation of this program the patient reported moderate relief of low back symptoms with complaints of pain ranging on average from 4 to 8/10. However, these exercises had no effect on the patient's sciatica or right leg pain.

PRI™ exercises

Visit 6

An exercise called a left 90/90 hemibridge (Hruska, 2005b) was added for muscle activation of the left hamstrings to correct the patient's pelvic position, which was hypothesized to be in an anterior tilt and left forward rotation (Figure 1). This pelvic position included relative left hip flexion; external rotation and abduction and concomitant right hip extension; internal rotation; and adduction (Levangie, 2005). The exercise technique is done with the patient's hips and knees at 90° and the patient holds her

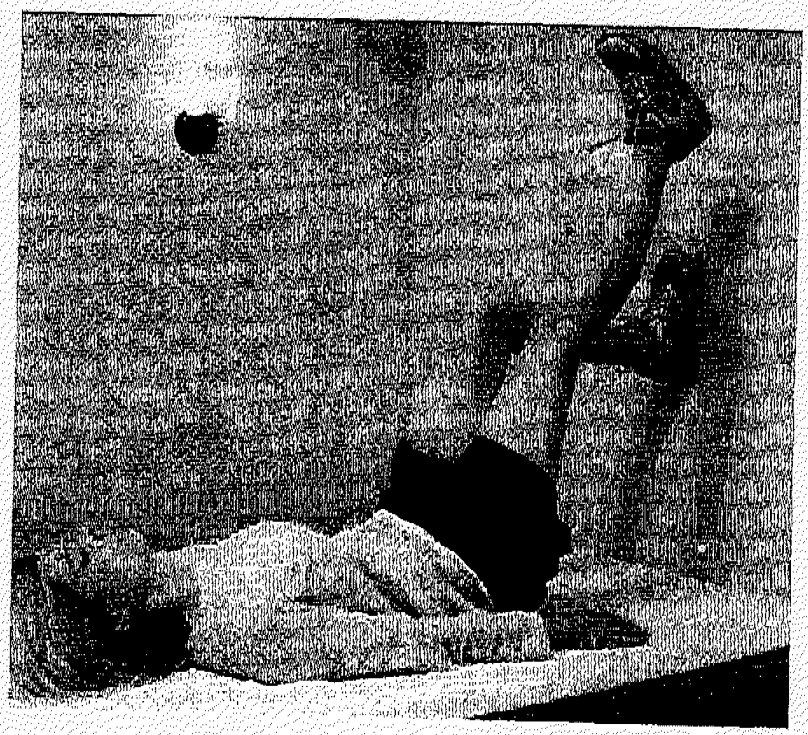

Figure 1. A 90–90 Hip Lift with Hemibridge with instructions below:
1. Lie on your back with your feet flat on a wall and your knees and hips bent at a 90-degree angle.
2. Inhale through your nose and exhale through your mouth performing a pelvic tilt so that your tailbone is raised slightly off the mat. Keep your back flat on the mat.
3. Maintain your hip lift with your left leg on the wall and straighten your right leg.
4. Slowly take your straight right leg on and off the wall as you breathe in through your nose and out through your mouth. You should feel the muscles behind your left thigh engage.

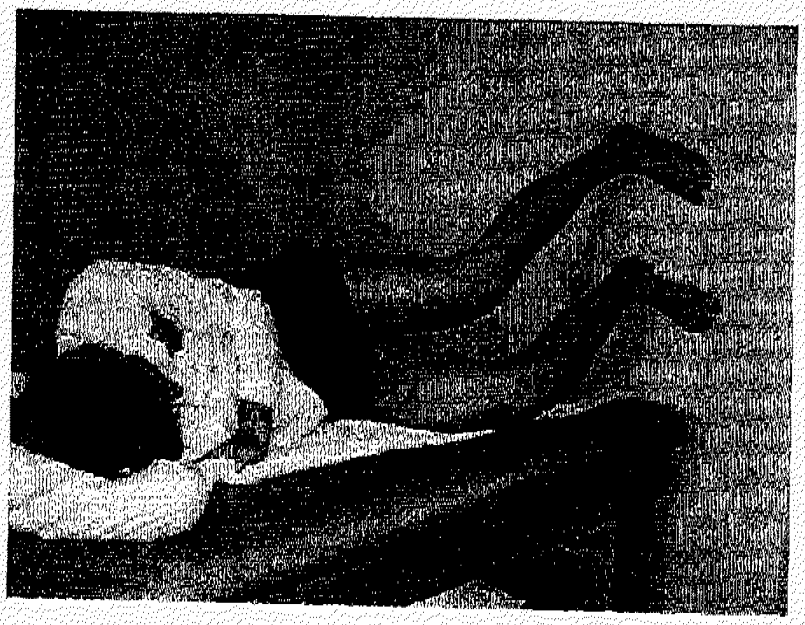

Figure 2. Right Sidelying Left Posterior Hip Capsule Stretch with instructions below:
1. Lie on your right side.
2. Place your left foot higher on the wall with your left foot turned inward.
3. Shift your left hip back upon inhalation and hold the stretch during exhalation.
4. Keep your left thigh turned inward and toward your right leg.
5. Feel a stretch in your left buttock.

Figure 3. Left Sidelying Knee to Knee in a Position of Left Acetabular Femoral Internal Rotation (L AF IR) with Left Femoral Acetabular Internal rotation and Adduction (L FA IR/Add) with instructions below:
1. Lie on your left side with your toes on the wall, knees together and back rounded.
2. Place a bolster underneath your ankles.
3. Push your bottom toes into the wall.
4. Shift your right knee forward.
5. Lift up or turn "out" your upper thigh.
6. Then lift up or turn "in" your lower thigh. You should feel your left inner thigh engage.
7. Hold your legs together while you take 4–5 deep breaths in through your nose and out through your mouth.

pelvis up with just the left leg musculature (hamstrings). The name 90/90 left hemibridge is descriptive of this position. The patient's left Ober's test was negative immediately after performing the exercise. The treating therapist hypothesized that this result may have reflected a change in pelvic position via the action of the hamstrings on the pelvis (hip extension).

Visit 7

A left posterior hip capsule stretch (Hruska, 2005b) was added to address the left passive hip IR impairment (i.e., decreased left hip passive IR and a decreased ability to adduct the left hip [acetabulum on femur] compared to the right hip). It included an active shift of the left leg back into the left posterior hip capsule upon inhalation. This exercise was very difficult initially for the patient to do (Figure 2). The patient performed four repetitions with a 20-second hold. After the patient completed the stretch, her left hip IR increased by six degrees.

Muscle activation was then targeted for the left adductors, obliques and right gluteus maximus via a left sidelying knee to knee technique (Hruska, 2005b) (Figure 3). These three muscle groups were targeted to move the position of the pelvis into the desired direction of left hip adduction left hip extension and left hip internal rotation. This positioning is hypothesized to help stabilize the pelvis in its new position following the 90/90 L hemibridge. The right gluteus maximus externally rotates the right hip (Moore and Dalley, 2006), which can assist in moving the left pelvis from a relatively forwardly rotated position to a backwardly rotated position. If a patient is in the asymmetrical postural position for a long time, the right gluteus maximus (Boyle, 2006) and the left adductors (Kendall et al, 2005) are believed to be long and possibly weak. The exercise technique was designed to shorten the left adductors

Figure 4. 90-90 Hip Lift with Balloon:

1. Lie on your back with your feet flat on a wall and your knees and hips bent at a 90-degree angle.
2. Place a 4–6 inch ball between your knees.
3. Place your right arm above your head and a balloon in your left hand.
4. Inhale through your nose and exhale through your mouth performing a pelvic tilt so that your tailbone is raised slightly off the mat. Keep your back flat on the mat. Do not press your feet flat into the wall instead dig down with your heels.
5. Inhale through your nose and slowly blow out into the balloon.
6. Pause 3 seconds with your tongue on the roof of your mouth to prevent airflow out of the balloon.
7. Without pinching the neck of the balloon and while keeping your tongue on the roof of your mouth, take another breath in through your nose.
8. Slowly blow out again as you stabilize the balloon with your hand. Do not strain your neck or cheeks as you blow.
9. After the 4th breath in, pinch the balloon neck and remove it from your mouth. Let the air out of the balloon.

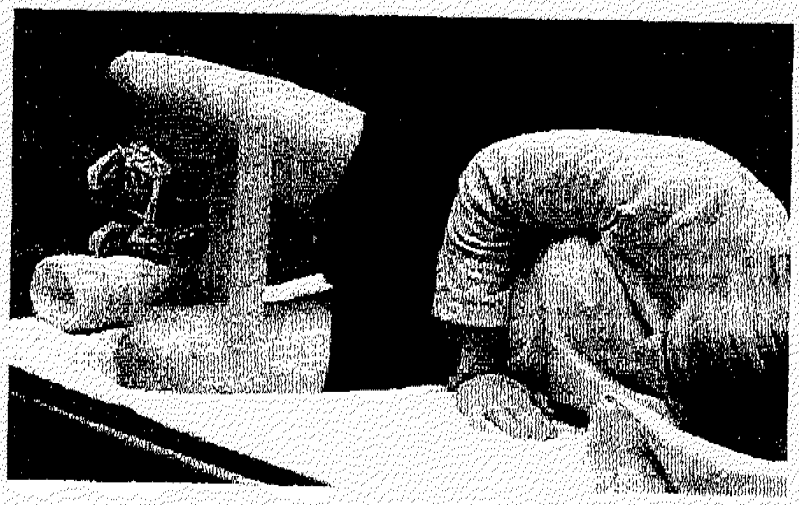

Figure 5. Left Sidelying Right Gluteus Maximus (L SL R GM) with Shift into Left Acetabular Femoral Internal Rotation (L AF IR) with instructions below.

1. Lie on your left side with your hips and knees bent at a 60–90-degree angle.
2. Place your ankles on top of a 3–5 inch bolster and place your feet firmly on a wall.
3. Place tubing around both thighs slightly above your knees.
4. Shift your right hip forward until you feel a slight stretch or pull in your left outside hip.
5. Keeping your toes on the wall, raise your right knee while keeping it shifted forward. You should feel your right outside hip engage.
6. Hold this position while you take 4–5 deep breaths in through your nose and out through your mouth.

Figure 6. Right Sidelying Left Anterior Gluteus Medius with Weighted Femoral Acetabular Internal Rotation and Abduction (R SL L Ant. Glut. Med. with FA IR/Abd) with instructions below:

1. Lie on your right side with your toes on a wall, ankles and knees together and your back rounded.
2. Place your lower arm under your head and upper hand on the floor in front of you to stabilize your trunk.
3. Place a pillow between your ankles and a folded towel between your knees.
4. Place a 3–5 lb ankle weight around your left ankle.
5. Slide and guide your left hip backward as far as you can without arching your back.
6. Push your right toes into the wall.
7. Raise your left ankle up while turning your left thigh "in" so that your left ankle is higher than your left hip. Now lift your left knee and ankle simultaneously towards the ceiling. You should feel your left outer hip engage.
8. Hold this position while taking 4–5 deep breaths in through your nose and out through your mouth.

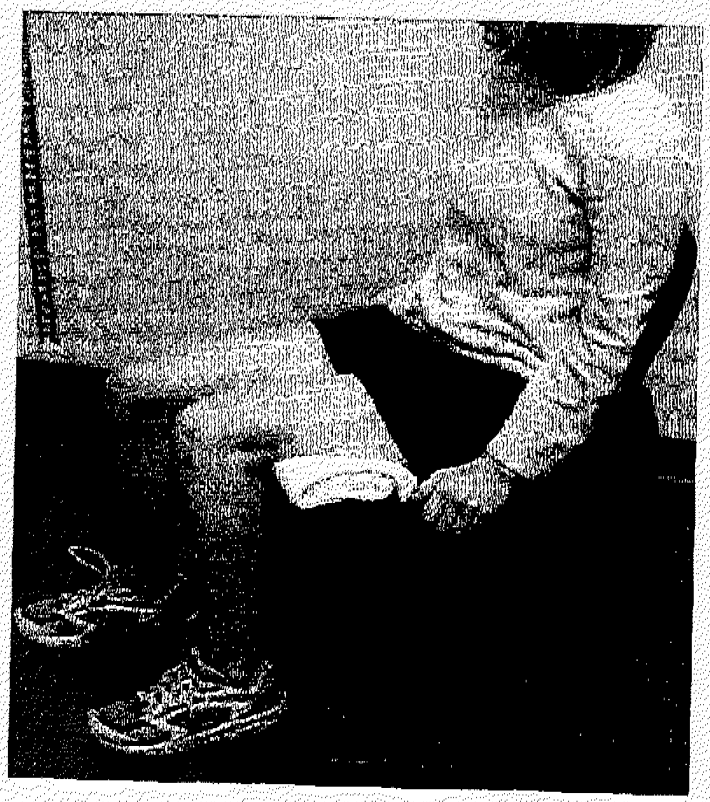

Figure 7. Sitting in a Position of a Left Shift with Left Acetabular Femoral Internal Rotation (L AF IR) with instructions below:
1. When in a seated position, keep your trunk rounded and your knees at or above hip level.
2. Place a small bolster under your left thigh and shift your left knee back.

first via a left pelvic shift (left acetabulum moving over the left femur) and then shorten further with the concentric contraction against gravity (left hip IR and adduction/left femur moving on the left acetabulum). Similarly, the right gluteus maximus was shortened first via the left pelvic shift (i.e., putting the right hip into ER and abduction) and then shortened further with the concentric contraction against gravity (right hip ER and abduction). This position effectively strengthens the muscles by placing them in a shortened position before activating them against gravity and strengthening them further (Hungeford, Gileard, and Hodges, 2003).

Visits 8–12

The therapist instructed the patient in a 90/90 hip lift with balloon for muscle activation of bilateral abdominals (transversus abdominus and internal obliques) and diaphragm and muscle inhibition of paraspinals (Hruska, 2002, 2004, 2005a, b) (Figure 4). Forced exhalation via the resistance of the balloon was thought to activate abdominals, intercostals, and the transversus thoracis (triangularis sterni) muscle and help facilitate rib depression and thereby decrease lordosis. Abdominal activation (trunk flexors) also tends to reciprocally inhibit paraspinal activity (trunk extensors). A pause at the end of the exhalation phase and before the next inhalation phase was thought to help reset the diaphragm, allowing it to fully lengthen and rest.

An exercise with resistance to further activate the right gluteus maximus (Hruska, 2005b) was then prescribed by the therapist (Figure 5). Muscle activation of the right GM was targeted to act as an anchor of stability for the left innominate. It was also prescribed to oppose right hip internal rotation (a concomitant position secondary to forward rotation of the left hemipelvis) via the gluteus maximus' action to move the hip (acetabulum on femur) into external rotation.

Table 1. Dosage for a home program of exercises (pelvic repositioning and retraining) for a female with right sciatica and low back pain; frequency prescribed was two or three times per day.

Exercise	Prescription
90/90 Hemibridge	10 reps * 3 sets
90/90 Hip Lift with Balloon	5 fills
L Sidelying Knee to knee	8 reps * 2 sets 5 second hold
L Sidelying Right Gluteus Maximus	5 reps, 30 second hold
R Sidelying Left Gluteus Medius	10 reps, 10 second hold
R Sidelying Left posterior capsule stretch	4 reps, 30 second hold

Table 2. Pain level and Ober's test (adduction drop test) (ADT) results over the course of physical therapy for a female patient with right sciatica and low back pain.

Visit number	Pain level	Ober's (ADT)
1 (Week 1)	5/10	Positive
2 (Week 5)	5/10	Not tested
3	3/10	Not tested
4 (Week 6)	4–5/10	Not tested
5	6/10	Positive
6 (Week 7)	7–8/10	Positive before treatment, negative after
7 (Week 8)	1–2/10	Not tested
8	0/10	Negative
9 (Week 9)	0.5/10	Negative
10	0/10	Negative
11 (Week 10)	*5–6/10	Negative
12 (Week 11)	0/10	Not tested
13 (Week 14)	0.5–1/10	Negative
14 (Week 14)	0–1/10	Negative
15 (Week 19)	0/10	Negative

*Patient injured back while lifting.

An exercise for muscle activation of the left anterior gluteus medius was added to the patient's program (Hruska, 2005b) (Figure 6). Activation of this muscle was added because it was believed by the therapist to have decreased recruitment as a result of limited left hip internal rotation.

Visits 13–15

Over the three final visits, the patient's home program was reviewed with verbal cues given to ensure proper technique. She was also instructed to sit with a pelvic shift to the left (Hruska, 2005b) where the acetabulum moves over the femur (AF) into internal rotation (IR) to oppose her tendency to sit in right AF IR (Figure 7). Dosages for the exercises are seen in Table 1. There was a three-week gap during this time because the patient was ill.

Outcomes

During visits 1–5 the patient reported a decrease in pain from visit two (5/10) to visit three (3/10), but there was no change in her right sciatica (Table 2). A minimal clinical significant difference (MCSD) in the pain scale is considered 2.5 for chronic pain (Ostelo and deVet, 2005). A MCSD for pain level was not achieved at this time. The Ober's test remained positive. Immediately after the patient performed the 90/90 hemibridge during visit 6, the patient demonstrated a negative Ober's test on the left. On visit 7, the patient stated her right leg was "feeling great" since her last appointment and that, "This is the first time I have had relief in years!" Over the following three visits, the patient's complaints of pain were from 0 to 1/10 and the Ober's test remained negative. From visit 9 through discharge at visit 15, the patient consistently demonstrated a negative Ober's test. On visit 11 the patient had a recurrence of LBP and R LE pain. She reported this to be the result of improper body mechanics while lifting a heavy object.

Upon discharge at visit 15, the patient demonstrated pain-free lumbar active range of motion. The patient's SLR on the right increased to 70° with no complaints of foot pain, and her SLR on the L increased to 75°. The Ober's test was negative at the discharge visit, and the patient reported pain at 0/10 (Table 2). The patient stated that: 1) She was able to eliminate her LBP and right leg pain completely with her home program particularly the 90/90 hemibridge; 2) She could go several weeks before having to perform her home program; and 3) She was able to walk up to

three miles and drive distances up to three hours without pain. The patient's pain level and Ober's test results over the course of physical therapy management are depicted in Table 2. The patient's ODI score upon discharge was 0%, indicating a change from moderate disability (40%) to no disability (0%). An MCSD for the ODI is considered 10 points or 20% (Ostelo and deVet, 2005).

Discussion

This case report is unique because of the unique exercises the physical therapist prescribed during the second half of the patient's care. The treating physical therapist was a new graduate and began to prescribe interventions based on generic stabilization exercises. When the patient's outcomes were not satisfactory for discharge, she then revised the management plan based on recommendations provided by the Postural Restoration Institute. The immediate and dramatic reduction in sciatica (right leg pain) and the chronic LBP, improvement in function, and patient satisfaction following the prescription of the postural restoration exercises is what prompted this case report.

The initial intervention for this case consisted of bilateral exercises focusing on movement in the sagittal plane (single and double knee to chest exercises for lumbar flexion) and general bilateral stabilization and abdominal recruitment (transversus abdominus contraction and marching with abdominal bracing). These exercises have been recommended for patients to decrease lumbar lordosis and to stabilize the trunk (Rittenberg and Ross, 2003). Levine and Whittle (1996) reported that altering the amount of pelvic tilt significantly changed the angle of lordosis. Levine and Whittle (1996) concluded that by increasing the degree of anterior pelvic tilt in a standing position, the angle of lordosis increased. In addition to decreasing lumbar lordosis, flexion exercises are also recommended for spinal stenosis to open the intervertebral spaces and canal (Manuel, 2002). These symmetrical sagittal plane exercises, however, did not change the right lower extremity symptoms, which gave strength to the hypothesis that pelvic girdle asymmetry may have been contributing to lateral foraminal narrowing and/or sciatic symptoms (Hall, 2005).

The treating therapist for this patient initially addressed the patient's increased lumbar lordosis by having the patient do flexion exercises and abdominal strengthening. The patient was also educated in proper body mechanics and lifting techniques that may have contributed to her initial improvement (Lorenz, Lavender, and Andersson, 2002). After learning the correct form, she performed her activities of daily living with better awareness of her body. However, she did have an increase in symptoms during her course of treatment that was believed to be directly related to poor lifting technique. In addition to being educated on body mechanics, she was also taught how to maintain proper posture with standing activities (Kendall et al, 2005). The patient had a tendency to stand with an anterior pelvic tilt. She was instructed to maintain a neutral pelvic position with weight-bearing activities that may have helped to decrease the strain on her back (Ickes, 2007).

Following this intervention, the therapist shifted her focus to address the pelvic asymmetry and the left hip impairment because the patient had continued right sciatica (leg pain). The therapist's goal was to determine if a positional asymmetry of the pelvis was present, then to achieve pelvic symmetry via exercise to reposition the pelvis, and then to retrain the patient to maintain the position. The therapist reasoned that the patient's pelvis was anteriorly tilted and forwardly rotated on the left. This position held over time could contribute to a restricted left posterior hip capsule if the patient compensated for the left pelvic forward rotation by externally rotating the left hip to avoid walking with the toes turned in. The therapist believed that it was important for the left hip to be able to be neutral in the joint (more adducted and internally rotated than abducted and externally rotated) to improve the pelvic asymmetry and sciatica symptoms.

Overall, the intervention consisted of unilateral exercises or nonmanual techniques that are defined as "specific processes incorporating muscle position, the two respiration phases, and appropriate concomitant muscle activity. These processes are designed to facilitate isolated muscle activation, muscle inhibition, or integrate desired neuromotor function while preventing compensation" (Boyle, 2006). In contrast to nonmanual techniques,

exercise, according to Kendall et al (2005), is described as those movements that are used to strengthen weak muscles, lengthen short muscles, increase endurance, or improve coordination. The terminology of nonmanual techniques is used to more accurately reflect the rationale for the intervention than using the word exercise.

The nonmanual techniques or exercises involved movement in all three planes: sagittal, frontal, and transverse. Rittenberg and Ross (2003) stated that it is important to provide triplanar rehabilitation to mimic function. The techniques targeted key muscle and soft tissue impairments. Implementation of the 90/90 L hemibridge (L hamstring activation), thought to reposition the pelvis, immediately coincided with a decrease in the patient's subjective pain intensity, an increase in patient satisfaction and function. It is possible that the patient could have been discharged sooner if the pelvic repositioning techniques (i.e., 90/90 L hemibridge) were started earlier. It is important to emphasize that the home program was specifically designed for the patient's specific impairments/right sciatica. If the therapist had clinically reasoned that the patient's pelvis was anteriorly tilted and forwardly rotated on the right, then a 90/90 R hemibridge for right hamstring activation would have been prescribed. If the patient's right hip IR was limited and right adduction (acetabulum on femur) was decreased, then a posterior hip capsule stretch on the right would have been prescribed.

The authors acknowledge that this patient was seen 15 times over 19 weeks, which is a longer time for management than in some settings. This may be attributed to the fact that the patient did not have any insurance limitations/caps and was seen by a new graduate in a hospital setting.

Further research is warranted to determine the validity of the Ober's test to reflect pelvic position and associated presentation of soft tissue. Further outcome research is also needed to investigate the efficacy of the exercises (nonmanual techniques) discussed in this case for management of patients with chronic right sciatica and LBP.

Conclusions

This case report suggests that specific unilateral exercises targeting triplanar muscle activation may be more beneficial than bilateral exercise targeting sagittal plane flexion mobility and general trunk/pelvic stability for a patient with chronic right sciatica and LBP. This case report also suggests that the exercises prescribed for specific muscle activation and muscle inhibition eliminated the right sciatic and LBP (2–9/10 to 0–0/10) and improved her function from moderate (40%) to no disability (0%) as measured by the ODI. Both outcome measures for pain and function exceeded an MCSD.

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