

Piriformis Syndrome Home Study Course

1 CE Hour

Text, Examination, and Course Guide

Presented by the:

Center for Massage Therapy Continuing Education

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Instructions for the Piriformis Syndrome home study course

Thank you for investing in the Piriformis Syndrome home study course, a 1 CE hour course designed to further your knowledge in the principles and practice of treating clients with signs and symptoms of piriformis syndrome. This guide will contain all of the instructions you will need to complete this course. This is a 1 CE hour course, so that means it should take you approximately 1 hour to read the text and complete the multiple choice exam and course evaluation.

The following are steps to follow in completing this course:

- 1. Read and review the exam and text in this file. The exam is provided for review before testing online and is the same as the online exam.**
- 2. When you are ready to test online, access the online examination by logging in to your account at <https://www.massagetherapyceu.com/login.php>.**
- 3. Complete your examination and print your certificate. The exam is open book and there is no time limit for completion.**

You must pass the exam with a 70% or better to pass this home study course. You are allowed to access and take the exam up to 3 times if needed. There is no time limit when taking the exam. Feel free to review the text while taking the test. This course uses the text *Piriformis Syndrome, an excerpt from Condition-Specific Massage*, by Celia Bucci. All of the answers can be found in the text. It is advised to answer the exam questions in the study guide before testing online. That way, when you are testing you do not have to go back and forth through the online exam.

If you have any questions please feel free to contact us at 866-784-5940, 712-490-8245, or info@massagetherapyceu.com. Most state boards require that you keep your “proof of completion” certificates for at least four years in case of audit. Thank you for taking our Piriformis Syndrome home study course.

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It is the responsibility of the practitioner to determine the appropriateness of the techniques presented in terms within the scope of practice. This information is in no way meant to diagnose or treat medical conditions. Written medical opinions are always the best way to resolve any questions regarding contra-indications to or advanced treatment of piriformis syndrome.

Piriformis Syndrome Exam

1. Which of the following nerves is most affected by piriformis syndrome?
 - A. Gluteal nerve
 - B. Pudendal nerve
 - C. Sciatic nerve
 - D. Tibial nerve
2. Which of the following is the action of the piriformis muscle?
 - A. Laterally rotates the hip and abducts the flexed hip
 - B. Medially rotates the hip and abducts the flexed hip
 - C. Laterally rotates the hip and adducts the flexed hip
 - D. Medially rotates the hip and adducts the flexed hip
3. All of the following are conditions commonly confused with or contributing to piriformis syndrome EXCEPT:
 - A. Bursitis at greater trochanter
 - B. Lumbar spinal stenosis
 - C. Spondylolisthesis
 - D. Radial nerve irritation
4. What is the importance of asking the client to describe what their symptoms feel like?
 - A. To get clues to the location of trigger points, injury, or other contributing factors
 - B. To differentiate between possible origins of symptoms, and determine the involvement of nerves or blood vessels
 - C. To determine if injury or surgery and resulting scar tissue may have caused adhesions, hyper- or hypotonicity, and atypical ROM
 - D. To determine if repetitive motions and static postures that increase lateral rotation or abduction of the hip are contributing to the client's condition
5. When comparing healthy posture to a posture affected by piriformis syndrome due to short lateral rotators of the hip, which of the following muscles is be shortened?
 - A. Gluteus maximus
 - B. Tensor fasciae latae
 - C. Semitendinosus
 - D. Gracilis
6. Which of the following passive ROM stretches may reduce pain caused by medial rotation when the piriformis is short?
 - A. Active medial rotation of the hip
 - B. Active abduction of the hip
 - C. Passive medial rotation of the hips
 - D. Passive lateral rotation of the hip

7. During treatment, if the client responds by tensing muscles or has a facial expression that looks distressed, which of the following is the best course of action?
 - A. Increase your pressure
 - B. Hold the stroke to further assess the tissue
 - C. Reduce your pressure
 - D. Discontinue the massage treatment

8. Where are trigger points in the piriformis frequently found?
 - A. Near the greater trochanter and near the sacrum
 - B. Near the iliac crest and near the midline of the buttock
 - C. Near the greater trochanter and near the popliteal fossa
 - D. Near the PSIS and near the sacrum

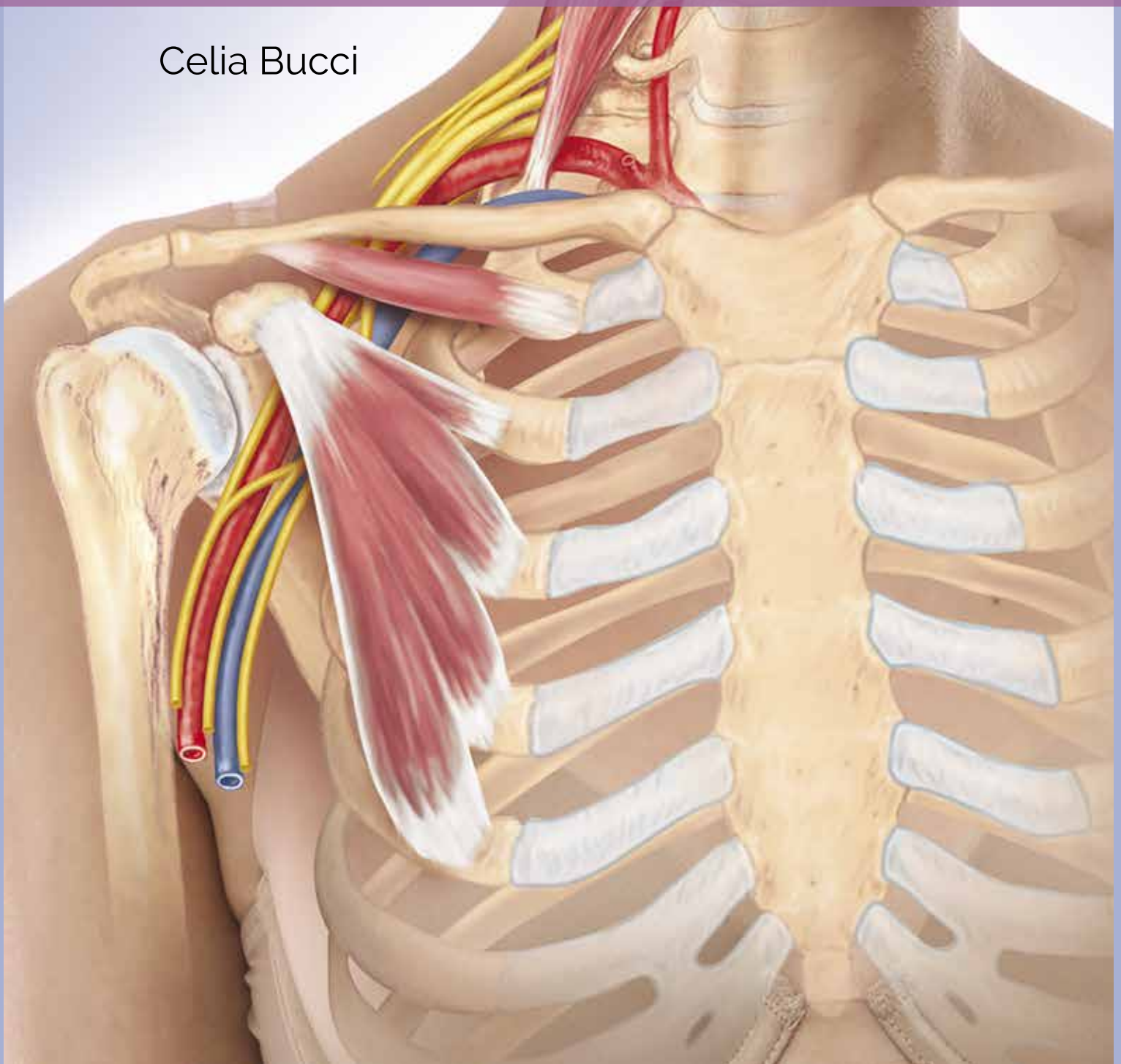
9. Ideally, a client with piriformis syndrome will have treatments:
 - A. Three times a week until the client can perform activities of daily living with minimal or no pain for at least 5 days
 - B. Twice a week until the client can perform activities of daily living with minimal or no pain for at least 4 days
 - C. Once a week until the client can perform activities of daily living with minimal or no pain for at least 4 days
 - D. Every day until the client can perform activities of daily living with minimal or no pain for at least 7 days

This completes the Piriformis Syndrome exam. Proceed to the next page to view the text.

Condition Specific Massage Therapy

SECOND EDITION

Celia Bucci



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Piriformis Syndrome

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Piriformis Syndrome

Understanding Piriformis Syndrome

Piriformis syndrome is a complex condition characterized primarily by myofascial pain with trigger points, which may involve nerve and vascular compression or sacroiliac joint dysfunction. Often, piriformis syndrome is reported as “sciatica,” a general term referring to pain along the sciatic nerve, which can result from a variety of causes other than piriformis syndrome including a herniated disc, impingement of the nerve between bones, degenerative disc disease, spinal stenosis, tumors compressing the nerve, and trauma.

Because the piriformis muscle fits precisely in the greater sciatic foramen, increased tone and trigger points that shorten and increase the width of the muscle decreases the space available for the nerves that also pass through the foramen to function optimally. Normally, the sciatic nerve emerges from the sacrum and passes deep to the piriformis muscle. In a small percentage of the population, the sciatic nerve travels through the piriformis or the piriformis muscle is split into two bellies with the sciatic nerve running between them. Although the sciatic nerve is most often affected by piriformis syndrome, the gluteal and pudendal nerves may also become irritated. Compression can also affect the vasculature, reducing circulation and affecting the health of the structures supplied by those vessels.

The sciatic nerve exits the spine as five separate roots between L4 and S3. They converge into one large sciatic nerve at the greater sciatic foramen under the piriformis muscle. From here, the nerve curves toward the hip and passes between the greater trochanter and the ischial tuberosity, then down the middle of the thigh along the length of the femur (Fig. 1). The sciatic nerve innervates the skin of the leg and foot, as well as the hamstrings. Just above the knee, the nerve divides into the common peroneal and tibial branches. Generally, these branches innervate the muscles of the anterior and lateral leg and the top of the foot and the posterior leg and the bottom of the foot, respectively.

Muscles innervated by the sciatic nerve and its branches include the following:

- Adductor magnus, posterior head (sciatic nerve)
- Semitendinosus (sciatic nerve)
- Semimembranosus (sciatic nerve)
- Biceps femoris (sciatic nerve)
- Plantaris (tibial nerve)
- Gastrocnemius (tibial nerve)
- Soleus (tibial nerve)
- Tibialis posterior (tibial nerve)

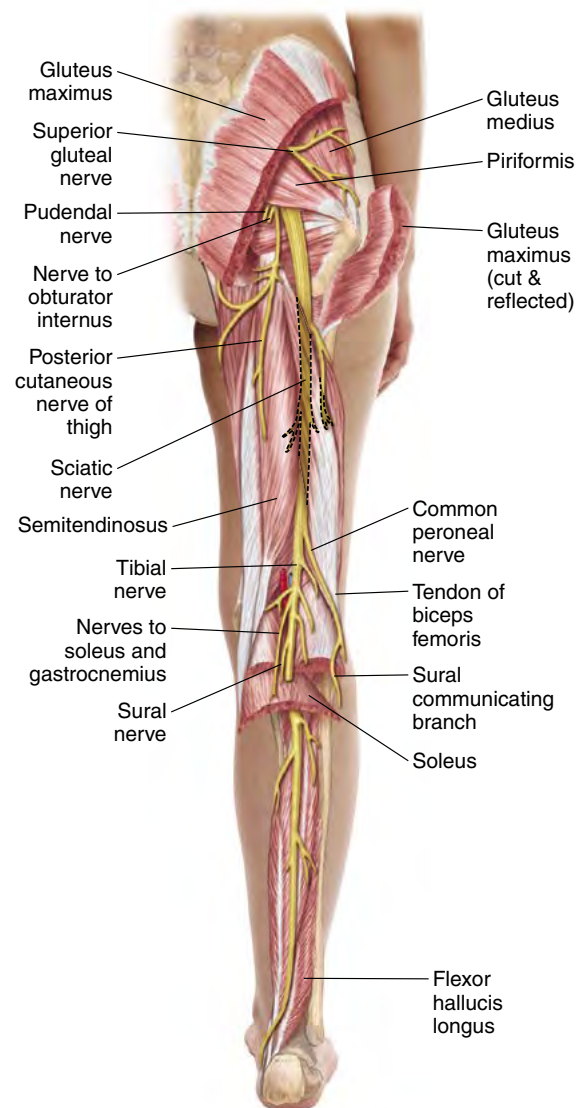


Figure 9-1 The sciatic nerve and its branches. The sciatic nerve passes under the piriformis muscle.

- Flexor digitorum longus (tibial nerve)
- Flexor hallucis longus (tibial nerve)
- Peroneus longus (superficial peroneal nerve)
- Peroneus brevis (superficial peroneal nerve)
- Tibialis anterior (deep peroneal nerve)
- Extensor digitorum longus (deep peroneal nerve)
- Extensor hallucis longus (deep peroneal nerve)
- Extensor digitorum brevis (deep peroneal nerve)
- Intrinsic muscles of the foot (medial and lateral plantar nerves)

COMMON SIGNS AND SYMPTOMS

The symptoms of piriformis syndrome usually begin gradually with pain in the low back, hip, or gluteal area. When the sciatic nerve is involved, radiating pain, numbness, or tingling is felt along the posterior thigh, calf, and foot. Active lateral rotation of the hip, which contracts the piriformis, and active or passive medial rotation of the hip, which stretches the shortened piriformis, may compress the sciatic nerve and intensify symptoms. An absence of numbness and tingling may suggest that the nerves are not involved; this is referred to as non-neurogenic piriformis syndrome. In these cases, referred pain from trigger points as well as weakness due to compensation may present similarly, and the condition can progress to involve the nerves and vessels if the syndrome is not treated.

Trigger points in the piriformis refer pain into the low back, buttocks, hip, and superior posterior thigh. When one piriformis is short, the sacrum may shift laterally toward the affected side and rotate anteriorly, causing sacroiliac joint dysfunction and pain in the low back. In this case, the ilium may be elevated on the opposite side. Sciatic nerve compression may cause pain in the posterior thigh with pain, numbness, and tingling radiating into the leg and foot and impaired proprioception causing an irregular gait and balance. Gluteal nerve irritation may cause pain in the buttocks and atrophy of the gluteal muscles. Pudendal nerve irritation can cause groin and perineal pain, bowel or bladder dysfunction, sexual dysfunction, and impotence. Irritation to the pudendal nerve has also been associated with prostatitis in men.

Sitting, walking, and climbing stairs often worsens the pain. Sitting, particularly with the affected hip flexed and adducted, such as with the legs crossed, often increases pain. Any posture or activity that opposes abduction or lateral rotation, the actions of the piriformis, stretches the muscle and may increase symptoms. If the condition has become chronic or is combined with hyperlordosis, it may be difficult for the person to find a comfortable position when sitting or lying down. Lateral rotation of the hip may relieve symptoms, but maintaining this posture encourages the deviation by keeping the piriformis short and weakening the medial rotators of the hip, decreasing their ability to oppose lateral rotation. Anomalies in posture associated with changes in the piriformis muscle may also decrease mobility in the sacroiliac joint and lead to changes in the muscles that attach to the sacrum and ilium, namely the latissimus dorsi, the lumbar erector spinae, and quadratus lumborum.

The further the syndrome progresses, the greater is the chance that the nerves will become damaged, causing changes in the tone and strength of the muscles innervated by them. In chronic cases, the client may develop an unsteady gait and postural instability due to impaired proprioception and weakening of the muscles from the gluteal region down to the foot. One presentation of this impairment is drop foot or difficulty in dorsiflexing the ankle, which causes the foot to drag or strike hard onto the ground when walking. Chronic compression may also contribute to edema in the lower leg and pallor, cooling, or dryness in the skin of the buttocks and leg. Therefore, it is important for a person suffering from even mild symptoms of piriformis syndrome to be treated as soon as possible.

POSSIBLE CAUSES AND CONTRIBUTING FACTORS

The piriformis muscle is the biggest of the six lateral rotators of the hip. It originates on the anterior surface of the sacrum and inserts on the superior aspect of the greater trochanter. The piriformis laterally rotates the hip and abducts the flexed hip. The sciatic nerve becomes compressed when the piriformis is shortened; it can also become hypertonic and develop trigger points. The other lateral rotators, namely the quadratus femoris, obturator internus and externus, and the gemellus superior and inferior, are likely involved in the postural deviation and should also be treated.

Standing with one hip laterally rotated with the weight on one leg or squatting with the knees separated also shortens the lateral rotators (Fig. 2). Sitting with the knees widely separated—a common posture for pregnant women or clients with a large abdomen—abducts and laterally rotates the hip, and passively shortens the muscles that perform this action. Adding weight or resistance to any of these activities increases the risk of spasm and trigger points in the piriformis.

The piriformis is overactive when the client’s posture involves medial rotation of the hips, valgus of the knees, and eversion of the ankle, a posture often referred to as “knock-kneed” (Fig. 3). In this posture, the lateral rotators are overstretched and overworked as antagonists to the medial rotation of the hips, particularly when walking, running, or climbing stairs. When hyperlordosis coexists with piriformis syndrome, muscles attached to the ilium, sacrum, and femur work harder to stabilize the joints, which may increase tension. Any increase in the tone of the gluteal muscles may increase the possibility of the sciatic nerve becoming compressed between the piriformis and the pelvis. Postural deviations and the signs and symptoms of plantar fasciitis may also be found in clients with symptoms of piriformis syndrome when these deviations involve rotation of the hips. With each of the postural deviations and activities described above, adhesions and trigger points may develop, reducing the ROM of the hip and sacroiliac joints.

Try these positions yourself. Begin by standing in the anatomic position. Now, laterally rotate one or both hips. Notice changes in the pressure on your pelvis, hips, knees, and ankles. Walk forward, and notice which muscles are compensating. When you stop walking, with the hips still laterally rotated, stand with your weight on one leg and notice how your pelvis, sacrum, and hips feel. With the hips still laterally rotated, sit down. Notice how your spine and pelvis compensate for this posture. If you draw your knees closer together, can you feel a stretch in the piriformis?

Now, stand and medially rotate your hips. Notice the change in distance between your knees, the angle of your femur, and the eversion in your ankle. Did you increase flexion in your knees to keep from straining the joint? While maintaining these deviations, walk forward. Feel the stress on your gluteal muscles and lateral rotators, the relative restriction in the ROM in your hips, and the stress on your knee as you try to move fluidly.

Carrying bulky objects, such as a wallet in a back pocket, can also compress the piriformis and the sciatic nerve, causing irritation, inflammation, spasm, and trigger points. Wearing tight pants low on the hips can put pressure on the sacrum, compressing the sciatic nerve as well as putting pressure on the lateral femoral cutaneous nerve at the anterior superior iliac spine, which may cause numbness and tingling in the anterior and lateral leg. Wearing high heels can contribute to atypical



Figure 9-2 Standing with one or both hips laterally rotated.



Figure 9-3 Valgus of the knees and medial rotation of the hips.

postures that contribute to hyperlordosis and piriformis syndrome. Dancers are often trained to adjust their posture to accentuate lateral rotation in the hips and plantar flexion of the ankle. A dancer who is still performing is unlikely to agree to therapy that restores a more balanced posture. The structures causing pain or other symptoms can be treated, although it may be necessary to omit any techniques intended to adjust posture, such as releasing deep fascial restrictions or fully lengthening the lateral rotators. In this case, the client is at risk for recurring symptoms.

Trauma, such as a fall or car accident, can cause inflammation of the piriformis, irritation to the nerves and vessels, and scar tissue formation. Trauma may also cause myositis ossificans—a calcification in the muscle that can induce symptoms of piriformis syndrome. Consult your pathology book for massage cautions and contraindications for clients with myositis ossificans. Other contributing factors include hip replacement, an aneurysm of the gluteal artery, degenerative disc disease, facet irritation, or bursitis at the greater trochanter. Consult the client's health care provider to determine the best treatment plan in these cases.

Other factors associated with nerve impairment include obesity, hypothyroid condition, arthritis, diabetes, gout, hormonal changes, lymphedema, rheumatoid arthritis, lupus, and Lyme disease. In these cases, the symptoms may quickly resolve once the associated condition is controlled. During pregnancy, body fluids and abdominal size increase while the center of gravity changes, which may contribute to compression that is likely to resolve after childbirth. Smoking cigarettes—although it is not a cause of piriformis syndrome—exacerbates the inflammatory process and thus can intensify the symptoms. Alcoholism, poor nutrition, vitamin B deficiency, and general stress may also contribute to nerve impairment.

Because so many potential factors contribute to peripheral neuropathies, it is essential to understand the client's health history before proceeding with treatment. Many of the conditions listed above involve contraindications for massage therapy or require adjustments to treatment. Moreover, when a systemic condition is a contributing factor for a peripheral neuropathy, particularly if that systemic condition is not being monitored by a health care provider, massage therapy alone may bring only temporary relief of symptoms. Refer the client to their health care provider for medical assessment if you suspect a systemic condition, and discuss massage treatment plans with the health care provider if such a condition is diagnosed.

Table 9-1: Differentiating Conditions Commonly Confused with or Contributing to Piriformis Syndrome

CONDITION	TYPICAL SIGNS & SYMPTOMS	TESTING	MESSAGE THERAPY
Sacroiliac joint dysfunction	Pain in the low back, hip, or pelvis Postural deviations Atypical gait	Physical exam Stork (Gillet's) test Gaenslen's test Yeoman's test X-ray	Massage therapy is indicated when the cause is neuromuscular. Consult with the health care provider if an underlying cause is suspected
Bursitis at greater trochanter	Aching in hip Pain worsens with movement or when lying on the affected side Feeling of swelling or fullness in the hip Skin is warm to the touch	Physical exam X-ray MRI	Massage therapy is systemically contraindicated if bursitis is due to infection. Massage is locally contraindicated in the acute stage to avoid increased swelling. In the subacute stage, massage to structures surrounding the joint is indicated.
Herniated lumbar disc	Muscle spasm Weakness or atrophy Low back pain Pain in buttocks, legs, and feet worsen when coughing, laughing, or straining Numbness and tingling in legs and feet	Physical exam including muscle reflexes and strength Straight leg raise test X-ray, CT, MRI, Electromyography (EMG) Myelogram	Massage therapy is indicated with caution and proper training. Work with the health care team.

Table 9-1: Differentiating Conditions Commonly Confused with or Contributing to Piriformis Syndrome (continued)

CONDITION	TYPICAL SIGNS & SYMPTOMS	TESTING	MASSAGE THERAPY
Nerve root compression (radiculopathy)	Muscle spasm, weakness, or atrophy Pain radiates to the extremities	Kemp's test Valsalva's test Neurological exam to test reflexes, sensation, and strength	Massage therapy is indicated if the cause and location of the compression are understood. Take care not to increase the compression or reproduce symptoms.
Diabetes	Frequent urination, frequent thirst, increased appetite, fatigue, nausea	Physical exam Fasting blood sugar test	Massage therapy is indicated when tissues and circulation are not compromised.
Myositis ossificans	Local mass that is hard and tender Limited ROM in joint involved	Physical exam X-ray	Massage therapy is locally contraindicated to avoid increased bleeding. Working around the edges of the injury may stimulate reabsorption.
Lumbar spinal stenosis	Pain and cramping in the legs Radiating back or hip pain Numbness, tingling, or weakness in the leg or foot Balance disturbance Loss of bowel or bladder function	Physical exam Spinal X-ray MRI CT scan or myelogram Bone scan	Massage therapy is indicated with caution. Work with the health care provider. Client may receive corticosteroid injections or may be using anti-inflammatory medication.
Spondylolisthesis (begins in the lumbar region and proceeds to the thoracic spine)	Lumbar hyperlordosis Pain in low back, buttocks, and thighs Stiff back	X-ray Straight leg raise test	Massage is indicated. Stretching and strengthening are encouraged.
Spinal or sciatic tumors	Pain in the back, hips, legs, and feet Loss of sensation or weakness in legs Difficulty walking Decreased sensitivity Loss of bowel or bladder function Varying degrees of paralysis Scoliosis or spinal deformity	MRI CT scan PET scan CBC Myelogram Biopsy	Refer to the health care provider if you suspect a tumor. Work with the health care provider if a tumor is diagnosed. Recommendations for massage depend on the type and location of the tumor.
Pudendal nerve irritation	Pain in the groin, genitals, and rectum Constipation Pain and straining during bowel movements Straining or burning when urinating Painful intercourse Sexual dysfunction	Pudendal nerve motor latency test (PNMLT) Electromyography (EMG) Diagnostic nerve blocks Magnetic resonance neurography (MRN)	Often the muscles of the pelvic floor are involved. Massage is indicated when treatment of these muscles is within the scope of practice for massage therapists. Work with the health care provider.

CONTRAINDICATIONS AND SPECIAL CONSIDERATIONS

First, it is essential to understand the cause of sciatic nerve symptoms. If a systemic condition is present, work with the client's physician, and consult a pathology text for massage therapists before proceeding. Following are a few general cautions:

- **Underlying pathologies.** Systemic conditions including diabetes, rheumatoid arthritis, and hypothyroidism may contribute to peripheral neuropathies. Spondylolisthesis or degenerative disc disease may be present. If you suspect an underlying condition (consult Table 1 and your pathology book for signs and symptoms), refer the client to their health care provider for medical assessment before initiating treatment. If the client is diagnosed with an underlying pathology that is not contraindicated for massage, work with the health care provider to develop a treatment plan that is appropriate for that individual.
- **Endangerment sites.** Be cautious near endangerment sites in the popliteal and femoral areas.
- **Reproducing symptoms.** Symptoms may occur during treatment if you manually compress the sciatic nerve or if the client's posture causes anatomic structures to compress them. If treatment produces symptoms, first adjust the client to a more neutral posture. If this does not relieve the symptoms, reduce your pressure or move away from the area. You may be able to treat around the site that reproduced the symptoms, but proceed with caution.
- **Treatment duration and pressure.** If the client is elderly, has degenerative disease, or has been diagnosed with a condition that diminishes activities of daily living, you may need to adjust your pressure as well as the treatment duration. Frequent half-hour sessions may suit the client better.
- **Positioning.** Use bolsters to position a client for comfort as well as to reduce postures that reproduce symptoms. In the supine position, reducing lateral rotation of the hips by placing bolsters at the lateral knee helps to keep the muscle closer to anatomic length and may facilitate access to the piriformis. If hyperlordosis is present, see the hyperlordosis course for guidelines.
- **Friction.** Do not use deep frictions if the client has an inflammatory condition such as rheumatoid arthritis or osteoarthritis, if the health of the underlying tissues is compromised, or if the client is taking anti-inflammatory medication. Friction creates an inflammatory process, which may interfere with the intended action of anti-inflammatory medication. Recommend that your client refrain from taking such medication for several hours prior to treatment if the health care provider agrees.
- **Injections.** If the client has had a steroid, Botox, or analgesic injection within 2 weeks of treatment, avoid that area. These injections reduce sensation and alter the physiology of the muscle, which may prevent the client from assessing your pressure adequately.
- **Tissue length.** It is important when treating myofascial tissues that you do not further lengthen those that are already stretched. Assess for myofascial restrictions first and treat only those that are clearly present. Likewise, overstretched muscles should not be stretched from origin to insertion. If you treat trigger points in overstretched tissue, use heat or a localized pin and stretch technique instead of full ROM stretches.
- **Hypermobile joints and unstable ligaments.** Be cautious with mobilizations if the client has hypermobile joints or if ligaments are unstable due to injury, pregnancy or a systemic condition.

MASSAGE THERAPY RESEARCH

A thorough literature review identified no peer-reviewed studies specifically on the benefits of massage therapy for piriformis syndrome. Much of the literature on the use of manual therapy to treat piriformis syndrome is found in textbooks and originates in other disciplines such as physical medicine, physical therapy, and chiropractic care. A closer examination is needed of the benefits of massage therapy applied to lengthen the tissues that are shortened and hypertonic along with self-care intended to strengthen the muscles that are lengthened and weak.

Several literature reviews explore the use of physical or manual therapy for relieving piriformis syndrome symptoms, although none of these offer specific treatment plans, and most cases involved surgery, Botox or other injections, and other interventions that include manual therapy only in an adjunctive role. The work of Travell and Simons (1999) explaining the role of trigger points in developing piriformis syndrome is sometimes mentioned, but the usual therapeutic intervention described to relieve trigger points is vapocoolant spray. “Massage Therapy and Restless Legs Syndrome” by Meg Russell (2007) mentions a relationship between piriformis syndrome and restless leg syndrome, but that study does not focus on symptoms specific to piriformis syndrome. In 2006, Peggi Honig received the Runner-Up Award from the Massage Therapy Foundation’s Student Case Report Contest for her study, “A Case Report of the Treatment of Piriformis Syndrome: Applying Modalities of Therapeutic Bodywork.” That study describes the case of a 43-year-old female with a history of chronic pain for a few years prior to this case study, whose symptoms of piriformis syndrome were reduced following massage therapy. Although the case study is unpublished, and a more comprehensive design may result in more conclusive findings, its outcome is encouraging.

Working with the Client

CLIENT ASSESSMENT

The symptoms of piriformis syndrome can be confused with more serious conditions, and a wide variety of possible factors can contribute to its development. All of these elements add up to many variations in how a client may present. For example, a client with lateral rotation of the hip who tends to stand with more weight on one leg may present with lateral flexion of the thorax, an elevated iliac crest, sacroiliac joint immobility, and rotation in the hips or spine affecting the latissimus dorsi, abdominal obliques, multifidi and rotatores, and the ligaments connecting the sacrum, pelvis, and spine. Hyperlordosis may also be present. What follows are common presentations for piriformis syndrome. However, it is essential to assess every involved joint to put together an accurate picture for each individual client.

Assessment begins with your first contact with a client. In some cases, this may be on the telephone when an appointment is requested. Ask in advance if the client is seeking treatment for a specific area of pain so that you can prepare yourself.

Table 2 lists questions to ask the client when taking a health history.

Table 9-2: Health History

QUESTIONS FOR THE CLIENT	IMPORTANCE FOR THE TREATMENT PLAN
Where do you feel symptoms?	The location of symptoms gives clues to the location of trigger points, injury, or other contributing factors. Radiating pain or numbness and tingling in the extremities indicate nerve involvement.
Describe what your symptoms feel like.	Differentiate between possible origins of symptoms, and determine the involvement of nerves or blood vessels.
Do any movements make it worse or better?	Locate tension, weakness, or compression in structures producing such movements.
Have you seen a health care provider for this condition? What was the diagnosis? What tests were performed?	Medical tests may reveal contributing factors as well as contraindications. If no tests were performed by the health care provider making a diagnosis, use the tests described later in this chapter for your assessment. If your assessment is inconsistent with the diagnosis, ask the client to discuss your findings with the health care provider or for permission to contact the provider directly.

Table 9-2: Health History (continued)

QUESTIONS FOR THE CLIENT	IMPORTANCE FOR THE TREATMENT PLAN
Have you been diagnosed with a condition such as osteoporosis, rheumatoid arthritis, or osteoarthritis?	Systemic conditions may contribute to signs and symptoms, may require adjustments to treatment, and may impact treatment outcomes.
Have you had an injury or surgery, or did your symptoms begin during a pregnancy?	Injury or surgery and resulting scar tissue may cause adhesions, hyper- or hypotonicity, and atypical ROM. Changes in posture during pregnancy may be a contributing factor.
What type of work, hobbies, or other regular activities do you do?	Repetitive motions and static postures that increase lateral rotation or abduction of the hip may contribute to the client's condition.
Are you taking any prescribed medications or herbal or other supplements?	Medication of all types may contribute to symptoms or involve contraindications or cautions.
Have you had a corticosteroid, Botox, or analgesic injection in the past 2 weeks? Where?	Local massage is contraindicated.
Have you taken a pain reliever or muscle relaxant within the past 4 hours?	The client may not be able to judge your pressure.
Have you taken anti-inflammatory medication within the past 4 hours?	Deep friction initiates an inflammatory response and should not be performed if the client has recently taken anti-inflammatory medication.

Postural Assessment

Allow the client to walk and enter the room ahead of you while you assess their posture and movements. Look for imbalances or patterns of compensation for deviations common with piriformis syndrome. Watch as the client climbs steps, looking for reduced mobility in the hips or whether the client favors one side. Assess for joint instability, limping, drop foot, lateral rotation of the hip, or hyperlordosis. Have the client sit to fill out the assessment form and watch to see if they lower into the chair cautiously or shifts around to find a comfortable position. Watch also as the client stands up to see if they are able to stand without assistance or if they lift out of the chair using the arms or by leaning on a stable surface.

When assessing the standing posture, be sure that the client is standing comfortably and naturally. If they deliberately try to stand in the anatomic position, you will not get an accurate assessment of their posture in daily life. In a postural assessment, you may notice a lateral rotation of the hips if the piriformis is short and hypertonic. Lateral rotation of one hip is often accompanied by rotation of the pelvis and slight flexion of that hip. The client may stand with the affected leg anterior to the unaffected leg so that one foot is in front of the other. Compensating patterns may include hyperextension in the knee of the unaffected leg, because the client shifts weight to that leg while favoring the affected hip. The client may also present with hyperlordosis; see the hyperlordosis course for postural assessment. If the client has sacroiliac joint dysfunction, they may have an elevated hip, rotation in the pelvis, or lateral flexion of the thoracic and lumbar spine. If the client's symptoms are due to overuse of the piriformis as an antagonist, you may observe medially rotated hips, knee valgus, and eversion of the ankle.

Figure 4 compares a healthy posture to a posture affected by piriformis syndrome due to short lateral rotators of the hip.

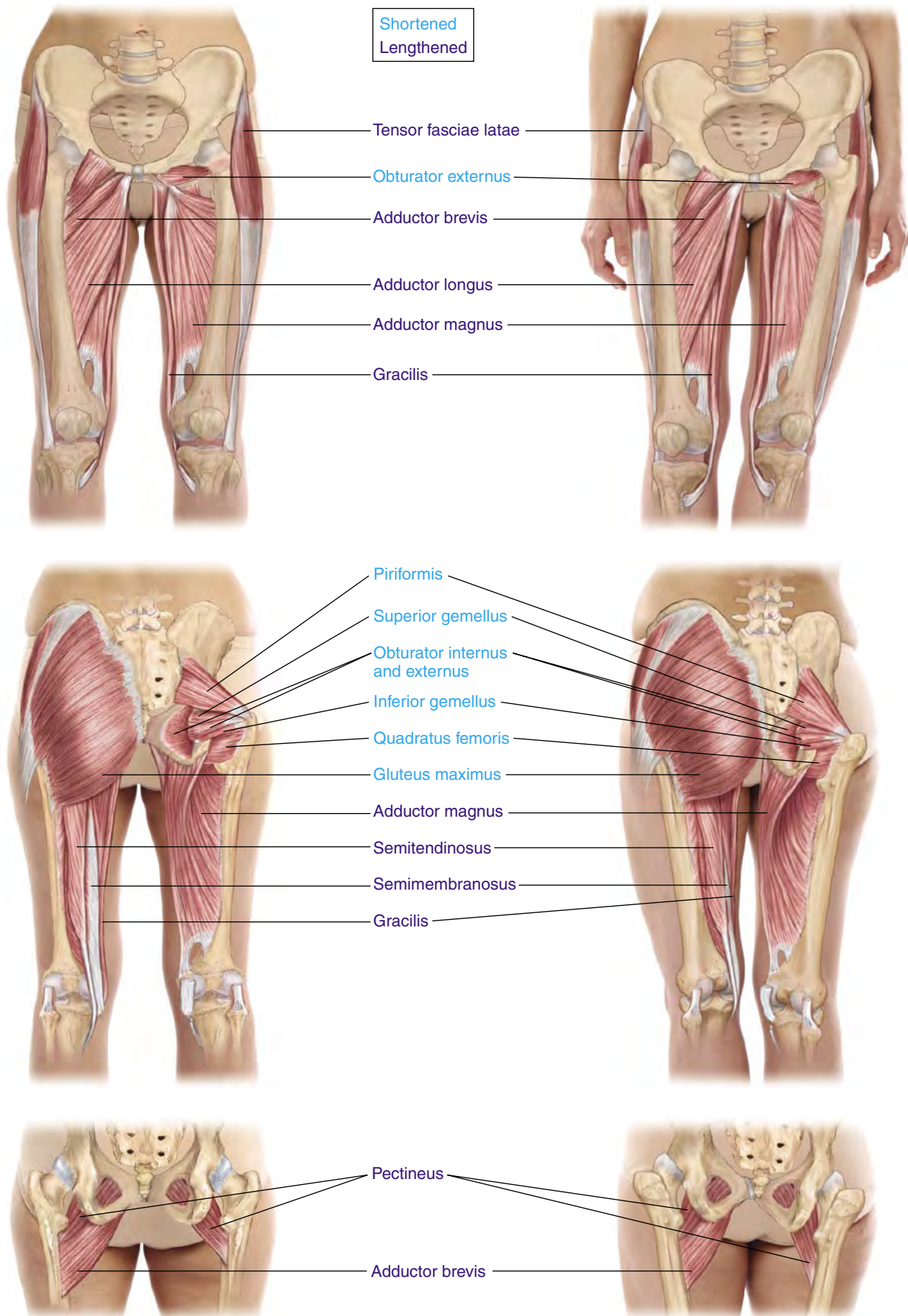


Figure 9-4 Postural assessment comparison. Compare the postures in these images. In the image on the right, note the lateral rotation in the right hip, tilting and rotation of the pelvis, and right lateral flexion of the thorax.

ROM Assessment

Test the ranges of hip motion that recruit the piriformis as either agonist or antagonist. Since it allows the client to control the amount of movement and stay within a pain-free range, only active ROM should be used in the acute stage of injury to prevent undue pain or re-injury. Box 1 presents the average active ROM results for the joints involved in piriformis syndrome.

Active ROM

Box 9-1: Average Active ROM for Joints Involved in Piriformis Syndrome

Hip

Flexion 110–120°

Rectus femoris
Gluteus medius (anterior fibers)
Tensor fasciae latae
Sartorius
Psoas major
Iliacus
Gluteus minimus
Adductor magnus
Adductor longus
Adductor brevis

Extension 10–15°

Biceps femoris
Semitendinosus
Semimembranosus
Gluteus maximus
Gluteus medius (posterior fibers)
Adductor magnus (posterior fibers)

Lateral Rotation 40–60°

Biceps femoris
Gluteus maximus
Gluteus medius (posterior fibers)
Sartorius
Piriformis
Quadratus femoris
Obturator internus
Obturator externus
Gemellus superior
Gemellus inferior
Psoas major
Iliacus

Medial Rotation 30–40°

Semitendinosus
Semimembranosus
Gluteus medius (anterior fibers)
Gluteus minimus
Adductor magnus
Adductor longus
Adductor brevis
Gracilis
Pectineus
Tensor fasciae latae

Hip (continued)

Abduction 30–50°

Gluteus maximus
Gluteus medius
Gluteus minimus
Tensor fasciae latae
Sartorius
Piriformis (with flexed hip)

Adduction 30°

Adductor magnus
Adductor longus
Adductor brevis
Pectineus
Gracilis
Psoas Major
Iliacus
Gluteus maximus (low fibers)

Trunk (at lumbar spine)

Flexion 50–60°

Rectus abdominis
External oblique (bilateral)
Internal oblique (bilateral)

Extension 25°

Spinalis (bilateral)
Longissimus (bilateral)
Iliocostalis (bilateral)
Multifidi (bilateral)
Rotatores (bilateral)
Quadratus lumborum (bilateral)
Latissimus dorsi (with arm fixed)

Lateral Flexion 25°

Spinalis (unilateral)
Longissimus (unilateral)
Iliocostalis (unilateral)
External oblique (unilateral)
Internal oblique (unilateral)
Quadratus lumborum (unilateral)
Latissimus dorsi (unilateral)

Ipsilateral Rotation 20°

Internal oblique (unilateral)

Contralateral Rotation 20°

Multifidi (unilateral)
Rotatores (unilateral)
External oblique (unilateral)

Knee

Flexion 120–150°

Biceps femoris
Semitendinosus
Semimembranosus
Gracilis
Sartorius
Gastrocnemius
Popliteus
Plantaris

Extension 0–15°

Rectus femoris
Vastus lateralis
Vastus medialis
Vastus intermedius

Medial Rotation (when flexed) 20–30°

Semitendinosus
Semimembranosus
Gracilis
Sartorius
Popliteus

Lateral Rotation (when flexed) 30–40°

Biceps femoris

Ankle

Dorsiflexion 20°

Tibialis anterior
Extensor digitorum longus
Extensor hallucis longus

Plantar flexion 50°

Gastrocnemius
Soleus
Tibialis posterior
Peroneus longus
Peroneus brevis
Flexor digitorum longus
Flexor hallucis longus
Plantaris

Inversion 45–60°

Tibialis anterior
Tibialis posterior
Flexor digitorum longus
Flexor hallucis longus
Extensor hallucis longus

Eversion 15–30°

Peroneus longus
Peroneus brevis
Extensor digitorum longus

Compare your assessment of the client’s active ROM to the values in Box 1. Pain and other symptoms may not be reproduced during an active ROM assessment because the client may limit movement to a symptom-free range.

- **Active medial rotation of the hip** may be restricted and cause pain, numbness, and tingling when the piriformis is shortened.
- **Active lateral rotation of the hip** may reduce pain caused by medial rotation when the piriformis is short and tight. Although less common, active lateral rotation of the hip may be restricted or cause pain when the piriformis is overactive as an antagonist to the short and tight medial rotators of the hip or when it is recruited to stabilize the hip joint.
- **Active abduction of the hip.** If the piriformis is short and tight, active abduction of the hip may be weak, and the hip may laterally rotate during the movement. This test is best performed in the side-lying position.

Passive ROM

Compare the client’s P ROM on one side to the other. Note and compare the end feel for each range.

- **Passive medial rotation of the hips** may be restricted and cause pain for a client whose posture or activities of daily living favor lateral rotation of the hips.
- **Passive lateral rotation of the hip** may reduce pain caused by medial rotation when the piriformis is short.

Resisted ROM

Use resisted tests to assess the strength of the muscles that cross the hip joint. Compare the strength of the affected side to the unaffected side.

- **Resisted lateral rotation and abduction of the hip** may cause pain in the low back, buttocks, and hip and numbness and tingling in the leg and may reveal weakness in the piriformis. The client may rotate the pelvis to compensate.

SPECIAL TESTS

The following special tests help to determine which muscles are contributing to pain and whether the client should be evaluated by a medical professional using X-ray or other tools, which may reveal conditions that are contraindicated or require special considerations when planning treatment with massage.

The **Valsalva maneuver** may reveal a herniated disc, tumor, or other factor that increases pressure on the spinal cord and is used when the client complains of pain in a localized area along the spine, particularly when coughing or sneezing. A herniated disc does not contraindicate massage, but this test is not specific for the cause of increased pressure. For this reason, if Valsalva maneuver is positive it is best to refer the client to a health care provider for further testing before performing the massage.

1. To avoid even a temporary reduction in circulation, do not perform this test if the client has tested positive for vertebral artery insufficiency or has cardiovascular disorders.
2. With the client seated facing you, ask them to take a deep breath and then attempt to forcefully exhale against the closed throat (such as when forcing a bowel movement).
3. The test is positive if the client feels pain in a localized spot along the spine. The client should be evaluated by a medical professional prior to receiving the massage.



Figure 9-5 Piriformis length test.



Figure 9-6 Pace test.

The **piriformis length test** assesses the length of the piriformis.

1. The client should lie prone with the knees and feet together and the knees flexed to 90°.
2. Instruct the client to keep the knees together while allowing the feet to fall naturally, unforced, to either side, which will medially rotate the hips and lengthen the piriformis (Fig. 5).
3. Compare the distance that each leg has moved from the midline. Notice whether one has moved further than the other.
4. The test is positive for a shortened piriformis on the side with less movement from the midline.

The **Pace test** is intended to assess the strength of the piriformis.

1. The client should be supine or seated with the knees placed together.
2. Place your hands on the sides of both knees, and ask the client to push the knees apart (abduct) against your resistance (Fig. 6).
3. Note weakness on either side. If the syndrome is unilateral, abduction on the affected side will be weaker than on the unaffected side.

The **stork test** is intended to assess sacroiliac joint mobility.

1. The client should stand near a stable surface or wall against which they can lean to maintain balance during the test.
2. Begin on the side you suspect is dysfunctional, but it is best to compare the results of both sides.
3. Kneel or sit behind the standing client with one thumb on the posterior superior iliac spine of the affected side and the other thumb on the sacrum at the same level.
4. Instruct the client to flex the hip and knee on the affected side to 90° or within their comfort range (Fig. 7). Notice the relative movement of your thumbs as the client flexes the hip.



Figure 9-7 Stork test.

- When the sacroiliac joint is normally mobile, the ilium should rotate posteriorly, moving the thumb on the posterior superior iliac spine inferiorly. The test is positive for decreased sacroiliac joint mobility if the thumb on the posterior superior iliac spine moves superiorly as the client flexes the hip.

Palpation Assessment

Assess the low back, gluteal area, and affected leg for atypical temperature, color, and texture. Compression of the sciatic nerve or the vessels feeding the soft tissues may cause cool skin, swelling, boggy texture, and even reduced hair growth. You may find adhesions around the attachment sites of the gluteal muscles and the lateral rotators of the hips. If bursitis is a contributing factor, the area around the greater trochanter may be hot and tender.

Palpate the gluteal muscles and the lateral rotators of the hip for tenderness, tone, and trigger points. Trigger points in the piriformis refer into the gluteal area and down the posterior thigh. If hyperlordosis is also present, see the hyperlordosis course for palpation guidelines.

If the client presents with an elevated iliac crest, sacroiliac joint dysfunction, or lateral flexion of the thorax or lumbar spine, assess the latissimus dorsi, quadratus lumborum, internal and external obliques, and thoracic and lumbar erector spinae. Although the focus here is on the muscles that are directly related to the postural imbalance seen in piriformis syndrome, it is essential to assess the synergists and antagonists in each ROM for these joints. For example, although the piriformis is a lateral rotator of the hip, it also abducts the hip. When it is short or otherwise compromised, any of its actions may be compromised, and any of the synergists and antagonists for each of its actions may be affected. In this example, you may find adhesions in the gluteal muscles and the lateral rotators. The biceps femoris, sartorius, and iliopsoas, which laterally rotate the hip, may also be short, adhered, or hypertonic. The medial rotators of the hip may be stretched due to the postural imbalance favoring lateral rotation and taut as a result of overwork as antagonists to lateral rotation. Overstretched muscles that may be adhered and contain trigger points include the semimembranosus, semitendinosus, adductor magnus, adductor longus, adductor brevis, gracilis, and pectineus.



Figure 9-8 Common trigger points associated with piriformis syndrome and their referral patterns.

CONDITION SPECIFIC MASSAGE

Since the causes of pain, numbness, and tingling in the low back and leg vary widely, the exact cause can be difficult to pinpoint and more than one condition may coexist. Systemic conditions such as diabetes may be a contributing factor to neuropathies and involve cautions or contraindications for massage therapy. If you feel uncertain whether the client's symptoms are caused by piriformis dysfunction, refer the client to their health care provider for medical assessment.

It is essential for the treatment to be relaxing. You are not likely to eliminate the symptoms associated with piriformis syndrome or any of the coexisting conditions in a single treatment. Do not attempt to do so by treating aggressively. Be sure to ask your client to let you know if the amount of pressure you are applying keeps them from fully relaxing. If the client responds by tensing muscles or has a facial expression that looks distressed, reduce your pressure. Remember that you are working on tissue that is compromised. Ask the client to let you know if any part of your treatment reproduces symptoms, and always work within their tolerance. Deep palpation of a trigger point may cause pain at the upper end of the client's tolerance. Explain this to your client, describe a pain scale, and suggest the level of pain that should not be exceeded; ask them to breathe deeply during the application of the technique. As the trigger point is deactivated, the referred pain will also diminish. Common trigger points and their referral patterns are shown in Figure 8.

If symptoms such as numbness and tingling are reproduced, you may be compressing the sciatic nerve. Adjust the client to a more neutral position, reduce your pressure, or move slightly off the area, and make a note about it, because this may help you understand more clearly exactly which neuromuscular condition is contributing to the client's symptoms.

The following are treatment suggestions for the more common presentation of piriformis syndrome caused primarily by the short, tight piriformis irritating the sciatic nerve. If the client has an acute injury, PRICE (protection, rest, ice, compression, and elevation) is the protocol. You may work conservatively proximal or distal to the site, but avoid the area of injury until the subacute or chronic stage.

Treatment Goals:



Increase circulation



Reduce adhesions



Reduce tone/tension



Lengthen tissue



Treat trigger points



Passive stretch



Clear area

- Begin with the client in a prone position with the ankles bolstered. If one or both heels of the feet fall closer to the midline than the toes, suggesting that the hip is laterally rotated, try to straighten the leg and minimize rotation by placing bolsters on the outside of the thigh just above the knee.



- Apply moist heat to the gluteal area of the affected side if indicated. If both sides are affected, move the heat to the gluteal area on the other side after heating the first.



- Use your initial warming strokes to superficially assess the tissues from the trunk down to the feet. You should be able to minimally assess the tissues of the mid and low back, gluteal area, thigh, leg, and feet, which may help you to determine where to focus the time remaining after treating the lateral rotators of the hip.



- If you notice swelling around the low back or gluteal area, apply superficial draining strokes toward the nearest lymph nodes.



- Before applying emollient, assess for and treat myofascial restrictions across the thoracolumbar aponeurosis.



- Assess and treat hypertonicity and trigger points in the latissimus dorsi, lumbar erector spinae, and quadratus lumborum, particularly if hyperlordosis is also present. Assess and treat these briefly for the moment. You can return to treat the area again if time permits.



- Remove moist heat, and assess the tissues around the sacrum and greater trochanter for myofascial restrictions and release them. It may be difficult to assess the gluteal area for superficial myofascial restrictions because of the presence of adipose tissue. Superficial restrictions around the attachment sites may be addressed more readily.



- Treat the gluteal muscles for hypertonicity and trigger points. Knead the tissues along the full length of the iliac crest and sacrum and around the greater trochanter to treat the attachments of the gluteal muscles and lateral rotators. To release adhesions in the deeper gluteal muscles, use cross-fiber friction beginning at the sacrum and move toward the greater trochanter. Lengthen tissues in each of the fiber directions of all three gluteal muscles to assess and treat hypertonicity and trigger points.

- Once the gluteal muscles are treated sufficiently to access the deeper piriformis, begin your specific work. To find the piriformis, place your fingers midway between the middle of the sacrum and the greater trochanter. Flex the client's knee to 90°, and ask the client to pull the foot away from you against your resistance. This lateral rotation will cause the piriformis to contract under your finger.



- Once you have found the muscle, slowly lengthen it from origin to insertion. Assess for trigger points as you slowly stroke along the length of the piriformis.



- Treat trigger points if any are found. Trigger points in the piriformis are frequently found near the greater trochanter and near the sacrum. If your treatment reproduces symptoms, adjust the client's posture, lighten your pressure, or move slightly off the area. As you proceed with the treatment, symptoms may lessen allowing you to treat more directly.



- Assess the quadratus femoris, obturator internus and externus, and the gemellus superior and inferior for hypertonicity and trigger points. These are small, deep muscles that may be difficult to distinguish. Familiarize yourself with their fiber directions and work generally to increase their length if you are unable to access each one individually. Lengthen these muscles manually, and treat any trigger points found.



- Stretch the lateral rotators by stabilizing the sacrum with one hand while bending the client's knee to 90° and gently pulling the leg toward you with the other hand (medial rotation) (Fig. 9).



Figure 9-9 Passively stretch piriformis.



- If the lateral rotators seem resistant to stretch, use postisometric relaxation to encourage lengthening. Bend the knee 90° and minimally rotate the hip medially by bringing the leg closer to you to lengthen the lateral rotators. Instruct the client to laterally rotate the hip by pulling the leg away from you against your resistance and hold for 10 seconds, or less if you feel a tremor or other sign that the muscles are fatiguing. Hold the leg steady while the client releases the contraction; then slowly rotate the hip medially by drawing the leg closer to you as fully as you can within the client's tolerance.



- Treat the thigh and leg for hypertonicity and trigger points and to restore neuromuscular function. Irritation of the sciatic nerve and its branches can cause changes in the tone and strength of any of the muscles innervated by it. Assess for adhesions, hyper- or hypotonicity, and weakness, and treat accordingly. If the tone is diminished, use stimulating strokes to encourage an increase in tone.



- Apply superficial gliding to the leg, thigh, and buttocks to clear the areas and encourage venous return.

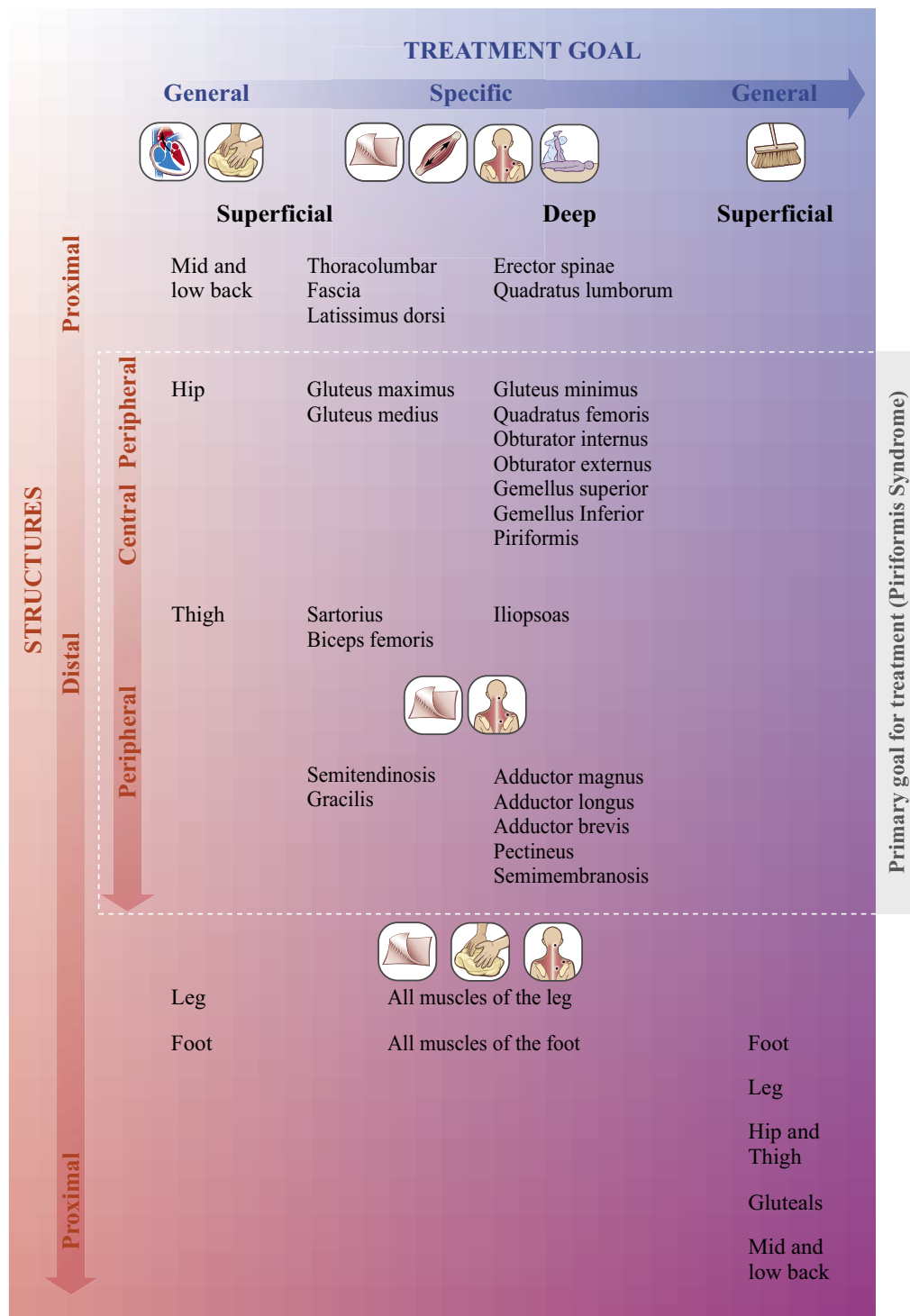
- With the remaining time, consider the other possible conditions that may develop with piriformis syndrome and treat these. Hyperlordosis suggests treatment to the hip flexors and lumbar spine extensors. Eversion or inversion of the ankle suggests treatment to the muscles of the lower leg and feet. You may not have time to treat all of these fully, but you can pay attention to some of them in each session, and as the signs and symptoms of piriformis syndrome decrease, you can increase the amount of time you spend in these other areas.

CLIENT SELF-CARE

The following are intended as general recommendations for stretching and strengthening muscles involved in the client's condition. The objective is to create distance between the attachment sites of muscles that have shortened and to perform repetitions of movements that decrease the distance between the attachments of muscles that have weakened. If you have had no training in remedial exercises and do not feel that you have a functional understanding of stretching and strengthening, refer the client to a professional with training in this area.

Clients often neglect self-care because their daily lives are busy. Encourage them to follow these guidelines:

- Instruct the client to perform self-care throughout the day, such as while taking a phone call, reading e-mail, washing the dishes, or watching television instead of setting aside extra time. When performing activities while standing, ask the client to notice if they are shifting weight to one leg and whether the feet point outward (laterally rotated hips). If so, instruct the client to focus on distributing weight evenly to both legs and on keeping the toes pointed forward within their comfort level.
- Instruct the client on proper seated posture to keep pressure off the weakened joints. Sitting in a chair that supports the back and allows the client to rest the feet flat on the floor with the knees and hips flexed approximately 90° may reduce muscle strain and stress on the joints. To reduce lateral rotation in the hips while sitting for long periods of time, the client can place a band around the knees to keep them from separating.
- Encourage the client to remove any bulky objects from the back pockets of their pants, particularly when sitting.
- Encourage the client to take regular breaks from repetitive actions.



- Demonstrate gentle self-massage of the hip to keep adhesions and hypertonicity at bay between treatments.
- Demonstrate all strengthening exercises and stretches, and have the client perform these in your presence before leaving to ensure that they are performing them properly and will not be harmed when practicing alone. Stretches should be held for 15-30 seconds and performed frequently throughout the day, within the client's limits, during an active flare-up. The client should not force the stretch or bounce. It should be slow, gentle, and steady, trying to keep every other muscle as relaxed as possible.



Figure 9-10 Piriformis stretch.



Figure 9-11 Piriformis stretch.



Figure 9-12 Strengthen adductors.

Stretching

To stretch the lateral rotators of the hip, instruct the client to sit at the edge of the chair with the hips medially rotated by bringing the knees together and the feet resting away from the midline, and then have them lean forward (Fig. 10). Hold the stretch for 15–30 seconds, and then stand and take a few steps to mobilize the hip.

Alternatively, instruct the client to lie supine with the hip and knee of the affected side flexed and the hand of the opposite side rested on the flexed knee. Pull the knee of the affected side medially into a twist until a stretch is felt (Fig. 11). Hold the stretch for 15–30 seconds, and then stand and take a few steps to mobilize the hip.

Strengthening

The choice of strengthening exercises depends on which structures are lengthened or have lost tone. Compensating patterns may differ depending on the client's contributing factors and posture. Nearly all of the muscles of the posterior thigh, leg,



Figure 9-13 Strengthen abductors.

or foot can lose tone and strength when innervation by the sciatic nerve is reduced. Assess the client thoroughly to determine which structures are affected before assigning strengthening exercises.

Because lateral rotation is the most common postural deviation, you may find the medial hamstrings and adductors lengthened, taut, and weak. To strengthen these, instruct the client to lie supine with their feet on the floor, knees bent, and a ball or other object adding resistance between the knees (Fig. 12). Instruct the client to adduct and medially rotate the hip by squeezing the knees together against the resistance of the ball and hold for 10 seconds, or less if they feel fatigue. The contraction can be repeated 5–10 times.

If the Pace test is positive for weak abduction, recommend strengthening the abductors. Instruct the client to stand with the support of a wall or chair while lifting the affected leg away from the midline (Fig. 13). It is important not to laterally rotate the hip when performing this exercise to keep the piriformis from shortening.

SUGGESTIONS FOR FURTHER TREATMENT

Ideally, a client with piriformis syndrome will have treatments twice a week until the client can perform activities of daily living with minimal or no pain for at least 4 days. When this occurs, reduce frequency to once per week until symptoms are absent for at least 7 days. When the client reports that they have been pain free longer than 7 days, treatment can be reduced to twice per month. If the client is pain-free for 3 or more consecutive weeks, they can then schedule once per month or as necessary. In the treatment of piriformis syndrome that is neuromuscular in nature, there should be some improvement with each session. If this is not happening, consider the following possibilities:

- There is too much time between treatments. It is best to give the newly treated tissues 24–48 hours to adapt, but if too much time passes between treatments in the beginning, the client’s activities of daily living may reverse any progress.
- The client is not adjusting activities of daily living or is not keeping up with self-care. As much as we want to fix the problem, we cannot force a client to make the adjustments we suggest. Explain the importance of their participation in the healing process, and encourage the client to follow your recommendations, but be careful not to judge or reprimand a client who does not.
- The condition is advanced or involves other musculoskeletal complications that are beyond your basic training. Refer this client to a massage therapist with advanced clinical or medical massage training. Continuing to treat a client whose case is beyond your training could turn the client away from massage therapy altogether and hinder healing.
- The client has an undiagnosed, underlying condition. Discontinue treatment until the client sees a health care provider for a medical assessment.

If you are not treating the client in a clinical setting or private practice, you may not be able to take them through the full program of healing. Still, if you can bring some relief in just one treatment, it may encourage the client to discuss this change with a physician and seek manual therapy rather than more aggressive treatment options. If the client returns for regular treatments, the symptoms are likely to change each time, so it is important to perform an assessment before each session. Once you have released superficial tissues in general areas, you may be able to focus more of your treatment on a specific area. Likewise, once you have treated the structures specific to piriformis syndrome, you may be able to pay closer attention to compensating structures and coexisting conditions.

Professional Growth

Case Study

Vittorio is a 35-year-old, single male. He is currently the marketing director for a nonprofit arts organization. Vittorio trained and performed as a professional ballet dancer until his retirement from dance 4 years ago. Within a year of retiring, he began feeling general aches in his hips, knees, and ankles. The symptoms have gotten worse, and he now feels numbness in his left leg and foot.

SUBJECTIVE

The client complained of pain in his hips, particularly in the left hip, with occasional general aching in his knees and occasional instability in his ankles. Approximately 6 months ago, he began to feel tingling down the back of his left leg and in the left foot after sitting at his desk for an extended period or driving long distances. Within the past 6 weeks, he has felt numbness in the leg and feels like the step of his left foot is heavier than the right. He has lost his balance more than once while taking the first few steps after having been seated for a while. In his job as a marketing director, he spends many consecutive hours seated. He commutes by car for an average of 1 hour in each direction and frequently drives to meetings. On the weekends, he is much more active, rarely uses his car, and has noticed that he has fewer symptoms. He has purchased a new chair with lumbar support and adjustable height to try to relieve symptoms. The use of this chair reduced the pain he had felt in his low back but had no effect on the pain, numbness, or tingling in his leg.

Vittorio visited his health care provider for a general checkup and to discuss the symptoms in his leg. He was concerned that changes in his diet, which now includes more packaged and take-out food, may be affecting his nervous system. A physical exam and blood tests revealed no underlying pathologies. He is considered to be in “excellent health.” His health care provider explained that while his current food choices may contribute to his symptoms and may make healing less efficient, they are not the cause of his pain. The health care provider prescribed physical therapy, which largely focused on strengthening exercises and reduced the pain in his knees and ankles, but Vittorio noticed that the numbness and tingling was often worse after sessions. His former dance instructor referred him to this clinic. When asked about changes in bladder or bowel movements, he replied that nothing had changed. He has no pain in the groin area. He has noticed no swelling, and does not feel unusual heat, cold, or fullness in the extremities.

OBJECTIVE

The client very clearly protects his left leg. He climbed the stairs using the rail on the left side, lifting his weight with the right leg for each step. When seated, his knees are widely separated. A bulge in the left pocket of his jeans suggests a large wallet or other object. A faded area of fabric around the edges of this bulge suggests that he carries this object in the same pocket regularly. Vittorio had no trouble sitting in the chair. He stood without assistance, but paused for a second, seemingly to check his balance, before walking again. Other than the widely separated knees, his seated posture is well balanced and erect.

Postural assessment revealed a significant lateral rotation of the hips bilaterally. When this was pointed out to Vittorio, he stated that he had trained for years to establish that posture, which is essential for a ballet dancer. I have worked with several dancers who specifically requested that the lateral rotation of the hips not be realigned, but Vittorio responded, “I don’t need it anymore,” with no apparent regret. He has minor hypolordosis and valgus of the knees. The ankles are everted bilaterally, and the lateral two or three toes are slightly extended (i.e., not fully rested on the floor). The posture of the upper body is normal.

His Valsalva test was negative for space-occupying lesions. The Pace test revealed significant weakness with abduction of the left hip. When asked to try to increase the strength of the contraction in the left hip, Vittorio rotated his trunk to compensate. Although his right hip is stronger, this result is relative. The stork test was negative for sacroiliac joint dysfunction. Active medial rotation of the hips reproduced no symptoms at first, but tingling began at 24 seconds.

Palpation revealed fascial restrictions across the hip joint bilaterally and at the thoracolumbar fascia. No swelling or temperature difference was apparent between the hips. The lateral rotators of both hips have increased tone. Only the lateral rotators of the left hip were tender to the touch. With deep palpation, pain reached a level 8 out of 10. Trigger points near both attachments referred pain within the gluteal area. Pain with compression to a trigger point near the trochanter reduced from level 8 to 5. Pain with compression to a trigger point near the sacrum reduced from level 7 to 3. The iliotibial bands are dense and adhered bilaterally, particularly on the superior aspect of the left. The left vastus lateralis is also dense with superficial adhesions. The adductors and medial hamstrings are tender to the touch (level 4 of 10) with taut bands. There is point tenderness near the adductor tubercle and medial condyle of the femur and the medial tibial plateau (level 6 of 10). The peroneus longus and brevis and extensor digitorum longus are hypertonic bilaterally. Distal tendons of the extensor digitorum longus are thick and short. Biceps femoris and ankle dorsiflexors are slightly hypotonic, and sensation is reduced compared to the right side.

The assessment suggests possible piriformis syndrome—neurogenic in the left hip and non-neurogenic in the right hip. The client was encouraged to discuss this assessment with his health care provider for a specific diagnosis.

ACTION

Treatment focused on reducing hypertonicity and restoring the proper length of the lateral rotators of the hip bilaterally with the additional goal of reducing irritation to the left sciatic nerve. I performed myofascial release to the thoracolumbar fascia and around the greater trochanters. I used cross-fiber friction on the iliotibial bands and vastus lateralis bilaterally. I softened the superficial tissues moderately, but the fibers were still obscured by adhesions. I applied general warming to the gluteal area followed by muscle stripping and trigger point therapy on the lateral rotators of the hips bilaterally. P ROM in the right hip increased by approximately 158 with no pain upon medial rotation. P ROM in the left hip increased by less than 108 with pain at a level 5 out of 10 upon medial rotation and with tingling in the thigh after 15 seconds in the initial attempt. PIR increased P ROM by only a few degrees, and all successive passive medial rotation of the left hip was confined to 10 seconds. No trigger points were found in the taut bands of the adductors semimembranosus and semitendinosus. Adhesions and warmth at the medial knee suggest strain on the pes anserinus tendon due to excessive lateral rotation and attempts by the medial rotators to oppose the action. The client felt no tenderness in the anterior leg, but the density of the peroneals and extensor digitorum and the minimal change in tissues following the application of superficial techniques limited the depth and pressure attempted in this session. The client felt an intense stretch with a passive inversion of the ankle. I applied stimulating strokes to the left biceps femoris and ankle dorsiflexors.

Following treatment, the client stated that he felt greater mobility in the hips and legs but did not feel confident enough to stop favoring the left leg. I explained that rushing into false confidence in his strength and stability could have negative consequences and that he should trust his instinct and sense of balance when standing or walking but do his best not to favor one side if it is not necessary.

PLAN

I demonstrated a stretch for the lateral rotators of the hips while seated. I recommended wrapping a band around the knees while he is seated for long periods to reduce the lateral rotation of the hips. I emphasized the importance of limiting the duration of stretches and removing the band around his knees if numbness, tingling, or pain beyond his tolerance occurs. Results during treatment suggested that stretches should be limited to 10-15 seconds to minimize the reproduction of symptoms. If, at any time, symptoms occur within 5 or fewer seconds, the client was advised to discontinue performing this stretch. We will reevaluate this recommendation in the next session.

I demonstrated stretches to the ankle evertors, emphasizing that these should be performed only if the client feels stable while standing and only with the assistance of a wall or other surface to lean on. If continued treatment reduces symptoms during activities of daily living, and as stability and balance are restored, strengthening exercises for the biceps femoris and the dorsiflexors of the ankle will be introduced.

The client's primary goal is to stop the loss of control he feels in his left leg. His secondary goal is to restore strength. His long-term goals are to realign the hips, knees, and ankles, although this is not a priority. He has agreed to treatments twice a week until symptoms are absent for at least 4 consecutive days, with reassessment at that time. Massage therapy prescribed by a health care provider is covered under his insurance. He will discuss this with his health care provider and request a referral to this clinic.

CRITICAL THINKING EXERCISES

1. Design an assessment and treatment plan that considers the contributing factors for a client with symptoms of piriformis syndrome due to overuse of the piriformis as an antagonist. This client will likely present with medial rotation of the hips, valgus of the knees, and eversion of the ankle. The assessment plan should consider ROMs that may be restricted, testing for muscle weakness, and palpation findings. Treatment goals should include lengthening shortened tissues, strengthening weak muscles, and restoring proper neuromuscular function.
2. A client presents with numbness and tingling in the legs and pain in the hip, low back, and groin. The client also reports having recently developed urinary difficulty. Symptoms suggest both sciatic and pudendal nerve irritation. Conduct a short literature review of manual therapy for restoring the function of the pudendal nerve. Develop a treatment plan for this client with special attention to aspects of treatment both within and outside the massage scope of practice. Include possible referrals to practitioners licensed to treat elements of this condition that are outside the scope of practice for massage therapists.
3. Develop a 10-minute stretching and strengthening routine for a client that covers all of the muscles involved in piriformis syndrome. Use Box 9-1 and Figure 9-4 as a guide. Remember that a stretch increases the distance between the origin and insertion of a muscle and is important for those muscles that are shortened while strengthening is performed by actively bringing the origin and insertion closer together and is important for the antagonists of shortened muscles. Describe each step of the routine in enough detail that the client can refer to these descriptions in your absence and perform them without harm.
4. A client calls to schedule a massage for hip pain with tingling down the back of the leg. She explains that she had a hip replacement following an accident 5 years ago when she was 22 years old. Her physician has cleared her for massage therapy. Discuss the possible relationship between the hip replacement and piriformis syndrome. What questions would you ask this client and her health care provider? What special considerations would you need to make in your treatment plan both for contributing factors and for contraindications? Would a hip replacement affect proprioception at that joint?

5. Conduct a short literature review to explore the relationship between symptoms suggesting compression of one or more nerves in the gluteal area and the following:
 - Facet joint irritation
 - Diabetes
 - Prostatitis
 - Myositis ossificans
 - Rheumatoid arthritis

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