

Diagnosis and Management of Piriformis Syndrome

Piriformis syndrome is a neuromuscular condition that remains poorly understood and often misdiagnosed.

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A 45-year-old woman presents with six-year history of left buttock pain that prevents her from participating in her exercise program of running, biking, and swimming. She describes 5/10 pain on Visual Analog scale. She characterizes the pain as aching and sore along left buttocks. It is constant and without numbness, tingling, weakness, and bowel or bladder dysfunction. Examination shows full lumbopelvic and hip range of motion. The Flexion Abduction Internal Rotation of the hip (FAIR) test is positive. She has tenderness over left mid-buttocks lateral to the SI joint. She has completed several courses of PT without relief and continues a home exercise program on a regular basis. MRI shows non-specific degenerative changes. Musculoskeletal ultrasound shows no abnormalities in piriformis but pain corresponds to palpation of the area.

The goal of this review is to discuss how a clinician might approach the evaluation and treatment of this patient.

PIRIFORMIS SYNDROME

Piriformis syndrome is a neuromuscular condition characterized by a constellation of symptoms that includes hip and buttock pain. The pain is often referred down the back of the leg, sometimes into the medial foot.¹ It is often associated with numbness in the posteromedial lower limbs. Though similar in presentation to a true L5 or S1 radiculopathy, this peripheral neuritis is presumed to be the result of an abnormal piriformis muscle or compression/irritation of the sciatic nerve as it travels under or through the muscle.² Given its similar presentation to

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lumbar disc herniation, stenosis, radiculopathy, and neurogenic pain, piriformis syndrome is often difficult to diagnose. Electrodiagnostic consultants are often called upon to make the distinction between piriformis syndrome and radiculopathy. Robinson was the first to use the term “piriformis syndrome” in 1947. In his description, he listed six key features: a history of trauma or direct fall to the buttock; gluteal or sacroiliac pain radiating down the leg that often limits ambulation; gluteal atrophy; a palpable sausage-shaped mass; positive Lasegue sign; and exacerbation with bending forward or lifting.¹

EPIDEMIOLOGY

Incidence and prevalence of piriformis syndrome is not clear, but it is suggested that piriformis syndrome is responsible for six to 36 percent of low back pain and “sciatica” cases.³ True prevalence is difficult to accurately determine because the diagnosis is largely clinical and is one of exclusion.¹ Piriformis syndrome occurs frequently during the fourth and fifth decades of life; found in indi-

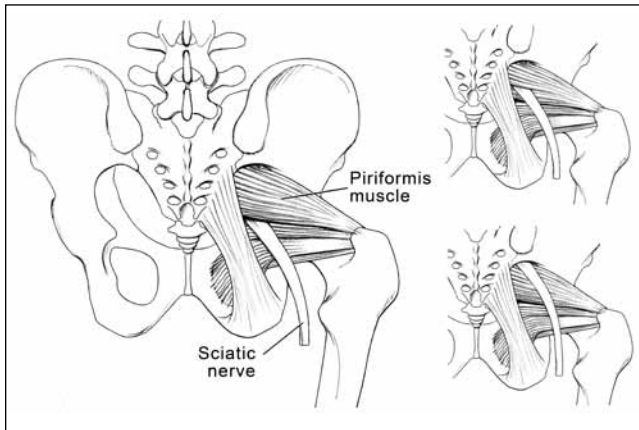


Figure 1. Anatomy of the piriformis muscle and sciatic nerve – posterior view. Left panel shows the normal anatomical relationship between the piriformis muscle and sciatic nerve, where the nerve exits the greater sciatic foramen along the inferior border of the muscle. Right panel shows two anatomical variations that may occur, where the sciatic nerve pierces (top) or exits along the superior border (bottom) of the piriformis muscle.

viduals of all occupations and activity levels. Jawish, et al. found only 26 of 3,550 complaining of sciatica were found to have piriformis syndrome.⁴ As much as 50 percent of patients with piriformis syndrome have a history of trauma direct from buttock contusion or a hip/lower back torsional injury.⁵

ANATOMY

The piriformis muscle is a flat, pyramid-shaped external rotator, weak abductor, and weak flexor of the hip, providing postural stability during standing and walking. It originates from the pelvic surface of the sacrum lateral to its sacral foramina, the margin of the greater sciatic foramen and the pelvic surface of the sacrotuberous ligament near the sacroiliac joint at vertebral levels S2 through S4. It attaches to the superior medial aspect of the greater trochanter and is innervated by spinal nerves S1 and S2. In the majority of the population, the sciatic nerve exits the greater sciatic foramen along the inferior surface of the piriformis muscle. However in some individuals, the sciatic nerve pierces or splits the piriformis muscle, which can predispose these individuals to piriformis syndrome. (Figure 1)

CLINICAL PRESENTATION

History and physical examination are critical to identify piriformis syndrome. The most common presenting symptom is increasing pain after sitting for longer than 15 to 20 minutes. Many patients complain of pain over the piriformis muscle, especially over the muscle's attachments



Figure 2. Demonstration of the Flexion Abduction Internal Rotation Test. The test places a stretch on the piriformis muscle and is positive when the pain is reproduced.

at the sacrum and medial greater trochanter. Symptoms, may be of sudden or gradual onset, are usually associated with spasm of the piriformis muscle or compression of the sciatic nerve. Patients may complain of difficulty walking and pain with internal rotation as a contracted piriformis muscle causes ipsilateral external hip rotation. There may be a history of local trauma, pain at the sacroiliac joint, sciatic notch and piriformis muscle, and increased pain with bending. Some female patients present with pain during sexual intercourse.^{3,6} Physical examination findings include tenderness to palpation and a palpable spasm at the piriformis muscle often detected by careful, deep palpation.³ Ipsilateral muscle weakness may occur if piriformis syndrome is caused by an anatomic anomaly or if it is chronic in duration. Range of motion evaluation may reveal decreased internal rotation of the ipsilateral hip in such cases.¹

Several physical exam maneuvers, detailed below, are consistent with piriformis syndrome. Piriformis sign is positive when a patient is relaxed in the supine position, the ipsilateral foot is externally rotated and active internal rotation causes pain. Lasègue sign is present when localized pain occurs when pressure is applied over the piriformis muscle and its tendon, when the hip is flexed at 90 degrees and the knee is extended. Freiberg sign is present if localized pain is experienced during passive internal rotation of the hip. Pace sign is positive if there is a recreation of sciatic symptoms with the patient in a lateral recumbent position, hip flexed to 60 degrees, knee flexed 60-90 degrees and while stabilizing the hip, the examiner internally rotates and adducts the hip by applying downward pressure to the knee. In the Beatty maneuver, the patient lies on the uninvolved side and abducts the involved thigh upward, which activates the ipsilateral piri-

FIGURE 3: DIFFERENTIAL DIAGNOSIS OF PIRIFORMIS SYNDROME

Differential Diagnosis of Hip Pain

- Trochanteric Bursitis
- Hip Osteoarthritis
- Osteoporosis
- Rheumatoid Arthritis
- Hip Fracture
- Septic Arthritis
- Osteonecrosis
- Osteomyelitis
- Osteomalacia
- Ankylosing Spondylitis
- Osteoid Osteoma
- Meralgia Paresthetica
- Paget's Disease
- Aortoiliac vascular occlusive disease
- Referred pain from the lumbosacral spine or sacroiliac joint

formis muscle causing localized pain in the buttock pain is positive.⁴ Diseases of the hip, including arthritis and trochanteric pain syndrome, as well as fracture, should also be considered in differential diagnoses. (Figure 3)

DIAGNOSTIC STUDIES

Radiographic studies have limited application to the diagnosis of piriformis syndrome. Although magnetic resonance imaging (MRI) and computed tomography (CT) may reveal enlargement of the piriformis muscle, these imaging technologies are most useful in this setting when ruling out disc and vertebral pathologic conditions. Diagnostic imaging of the lumbar spine is necessary to exclude disc herniation, arthritis, fractures and pathological masses.^{4,7} Electrodiagnostic testing is beneficial in differentiating piriformis from other conditions. Nerve impingements are usually accompanied by EMG abnormalities, muscle weakness, and atrophy of muscles distally and proximally to piriformis, whereas piriformis syndrome typically exhibits weakness and atrophy only in distal musculature. The electrodiagnostic evaluation may show signs of denervation in the muscles innervated by the sciatic nerve. Involvement of the paraspinal muscles argues against a diagnosis of piriformis syndrome. Additionally, H reflex may be prolonged or absent in the affected limb. Work done by Fishman has suggested that a prolonged H latency in the adducted and flexed hip is suggestive of piriformis syndrome.⁸

FIGURE 4: AN OSTEOPATHIC APPROACH TO TREATMENT

An Osteopathic Approach to Releasing a Piriformis Spasm (Based on Boyajian-ONEILL, L A, 2008)

1. Place the patient prone while the physician sits on the side of the spasm, the patient toward the edge of the table.
2. Gently grasp the knee with one hand and monitor the spasm with the other hand.
3. Ease the patient into external rotation and some flexion to the patient's comfort. Monitor the spasm for a sense of release and patient comfort.
4. While resting the patient's leg on the physician's knee or thigh, flex patient's hip off the table (approximately 135 degrees), markedly abduct and external rotate.
5. Adjust to reduce patient's pain to lowest number by making small adjustments to hip flexion/extension and internal/external rotation.
6. Continue to monitor the spasm with cephalad hand. If desired, physician can add a small compressive force up the femur toward the sacrum with caudad hand.
7. Maintain this position for 90 seconds or until the spasm releases. Return patient to original position and reassess spasm.

TREATMENT

Owing to a lack of clinical trials and a lack of consensus on diagnosis, treatment of piriformis syndrome largely utilizes conservative methods, such as stretching, manual techniques, injections, NSAIDs, muscle relaxants, ice and activity modifications. The mainstay of treatment is piriformis stretching, which focuses on relaxing tight muscles to relieve nerve compression. Stretches are done in standing and supine positions, involving hip and knee flexion, hip adduction, and internal rotation of the thigh. Physical therapy is commonly utilized to teach proper stretching techniques. The goal is symptom elimination through relaxation of the tight muscles, increased range of motion and increased muscle strength. Use of osteopathic based techniques, such as counterstrain, have been very successful in relieving the pain associated with piriformis spasm. The protocol is outlined in Figure 4.³

Lidocaine injections into the piriformis sheath can assist in the diagnosis of piriformis syndrome. Corticosteroid injections may provide enough temporary analgesia to allow patients to participate in physical therapy, but it does not correct the underlying pathophysiology and may need to be repeated. Other potential treatments for

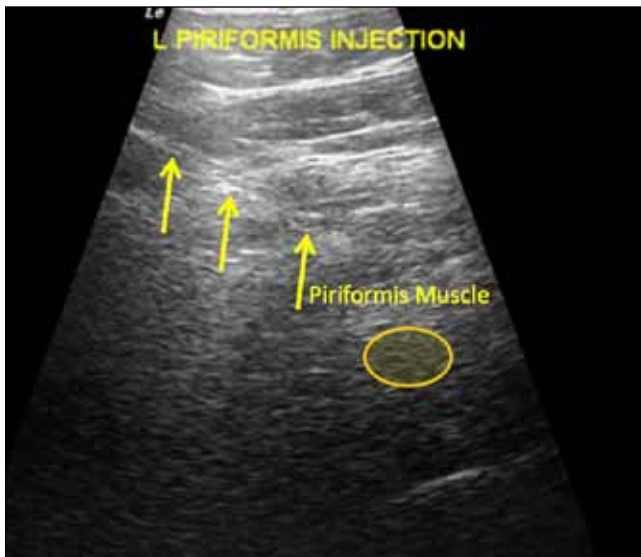


Figure 5. Ultrasound Guided Corticosteroid Injection into the piriformis muscle. Corticosteroid and lidocaine preparations can be injected into or around the nerve sheath whereas botulinum toxin injections should be placed within the muscle itself. Care must be taken to not inject the sciatic nerve proper.

patients with piriformis syndrome include prolotherapy, involving injection of an irritating solution at the origin or insertion of ligaments or tendons to strengthen the weakened or damaged connective tissue. Injections with neurotoxins such as botulinum toxin are also being investigated. Neurotoxins are potent paralytics that, when injected into the muscle, are hypothesized to reduce the hip and leg pain associated with excessive contraction of the piriformis muscle. Childers completed a randomized double blind study which suggested that intramuscular toxin injections into piriformis muscle could reduce pain. Fishman found botulinum toxin A and B both to be beneficial adjuncts to physical therapy.^{5,9,10} As a last treatment option, surgical decompression can be considered. The goal of surgery is to reduce any tension in the piriformis muscle and to ensure that there are no fibrous bands or constrictions compressing the sciatic nerve.⁷

APPROACH TO CASE AND CONCLUSION

The patient above was treated with activity modification to prevent overtraining while maintaining a stretching program as described in Figure 4. She had limited relief with a corticosteroid injection under ultrasound guidance, and had near complete resolution of symptoms with an injection of 100 units botulinumtoxinA into the piriformis under ultrasound guidance.

In conclusion, piriformis syndrome is a neuromuscular condition that, while coined in 1947, remains a poorly

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understood and often misdiagnosed. It is a complicated condition that must be considered in the differential diagnosis of low back pain, “sciatica,” hip pathology or SI joint pain. Further research into the epidemiology and treatment options for piriformis syndrome is warranted. ■

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