Piriformis Syndrome

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Definition

Piriformis syndrome is a buttock pain caused by compression of the sciatic nerve by a tight piriformis muscle. It is a constellation of symptoms including gluteal pain with possible lower extremity radiation, numbness, and tingling. It usually does not present with weakness or sensory loss, except in chronic conditions. The syndrome should not be confused by piriformis-mediated muscle pain, SI joint pain, or lumbar radiculopathy.

Piriformis syndrome comes in two types, primary and secondary [1]:

- Primary: due to anatomic variation, such as a split sciatic nerve, a split piriformis muscle, or an anomalous sciatic nerve path. Fewer than 15% of cases are known to have primary causes.
- Secondary: due to a known cause, including trauma, mass effect, and local ischemia. Gait abnormalities can accentuate this.

Diagnosis

Piriformis syndrome continues to be a controversial diagnosis for sciatic pain. Some authors believe it is underdiagnosed; others believe it is overdiagnosed [2, 3]. Piriformis syndrome is based on history and physical exam, including special testing such as piriformis sign, FAIR, Beatty, and Lasegue sign. Correlation of provocative tests with abnormal piriformis morphology has been attempted, but resulted in an inability to create a criterion standard to diagnosis piriformis syndrome [4]. Imaging is used to identify anatomical variants and to rule out other pathologies. EMG exam is often normal, although Fishman et al. propose that a prolonged H-reflex (mean 1.87) in the affected lower extremity is associated with piriformis syndrome [5].

History

- 1928: Yeoman reported that periarthritis involving the anterior sacroiliac ligament, the piriformis muscle, and branches of the sciatic nerve may be contributors of sciatica [6].
- 1934: Friedberg and Vinke believed that inflammation of the sacroiliac joint may cause a reaction of the piriformis muscle and its fascia, as well as irritation of the lumbosacral plexus [7].
- 1938: Beaton and Anson hypothesized that the spasm of the piriformis muscle could irritate the sciatic nerve [8].
- 1947: Robinson first coined the term "piriformis syndrome" and emphasized the necessity to rule out other causes of sciatica. The six features he described: history of trauma to the buttock, gluteal or sacroiliac pain radiating down the leg, often limiting ambulation, gluteal atrophy, palpable sausage-shaped mass, and positive Lasegue sign [9].

Differential Diagnosis

- Spinal: lumbosacral disc pathology with radiculopathy, facet arthropathy, sacroiliac (SI) joint arthropathy, spinal stenosis, and spondylolysis
- Hip pathology: osteoarthritis, labral tear, femoral-acetabular impingement (FAI), and greater trochanteric pain syndrome
- Muscles: hamstring strain and lumbar muscular strain

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- Nerve: radiculopathy, pudendal neuralgia, posterior femoral cutaneous neuralgia, and inferior cluneal neuralgia
- Sciatic neuropathy of other cause: tumor, infection, hematoma, aneurysm, and endometriosis

Epidemiology

- Prevalence varies widely, depending on the diagnostic criteria used and the characteristics of the sample population [1]. A 2013 prospective study (2,910 patients) of the prevalence of piriformis syndrome among the cases of low back/buttock pain with sciatica showed that the prevalence is 6.25%. Females are more affected than males. Right side affected more than left [10].
- Etiology and associations: more common – overuse, prolonged sitting, trauma, and vigorous massage [10]. Less common – bilateral THR [11], leg length discrepancy [12, 13], endometriosis [14], pregnancy [15], accessory piriformis muscle [16], and atorvastatin [17]

Anatomy

- The piriformis muscle originates from the anterior border of the sacrum and attaches to the superior margin of the greater trochanter. It is the only muscle that transverses the sciatic notch. Numerous nerves and vessels that pass from the pelvis to the gluteal region come posteriorly above or below this muscle, which is innervated by ventral rami of S1 and S2 (Fig. 51.1) [18].
- The sciatic nerve may exit the pelvis into the gluteal region by six different routes [19]. These anatomic variations of the sciatic nerve may be associated with a higher incidence of piriformis syndrome, but more recent studies have shown this may not be the case (Fig. 51.2) [20].

History and Physical

- Singh et al. did a prospective study on 2,910 patients with low back and buttock pain to determine the frequency (%) of symptoms and physical exam findings (Table 51.1) [10].

Imaging and EMG

- Imaging such as MRI, CT, and ultrasound is used to view anatomical variants, spinal pathologies, nerve compression, joint abnormalities, and tumors. Hip or pelvic MRI is not sensitive in diagnosing piriformis syndrome [19].

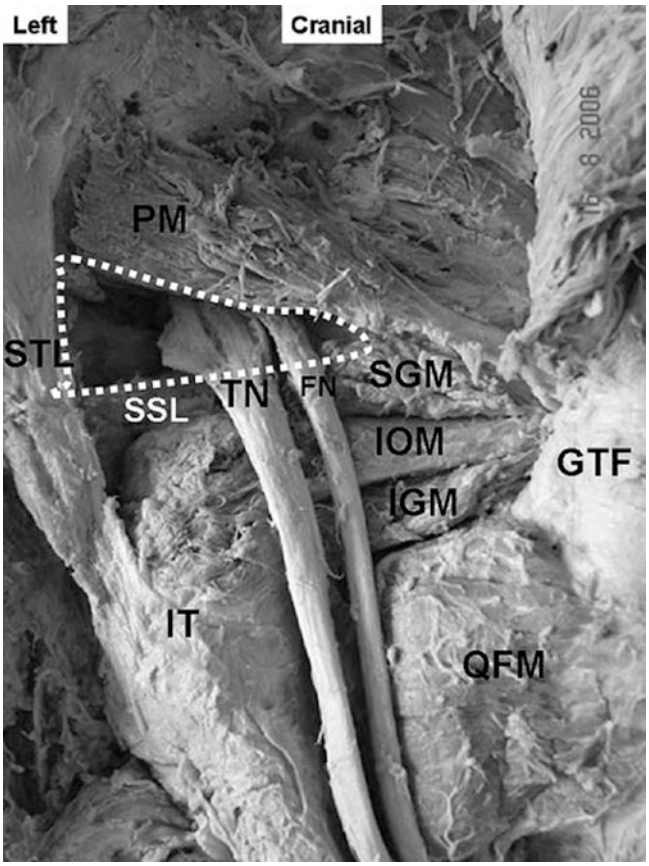

Fig. 51.1 Piriformis anatomy (Reproduced from Guvencer et al. [18]. With kind permission from Springer Science and Business Media)

- MR neurography and interventional MR imaging can reveal piriformis muscle asymmetry and sciatic nerve hyperintensity at the sciatic notch, differentiating patients with piriformis syndrome from those without who had similar symptoms ($p < 0.01$) [22]. To note, the author of this study does have a financial interest in this imaging technology.
- Fishman has shown that patients with piriformis syndrome have a normal electrodiagnostic study, except the ipsilateral prolongation of H-reflex latency greater than 1.86 ms in the affected leg [23]. This has not been reproduced in other studies.

Treatment

See Table 51.2.

When to Refer

See Table 51.3.

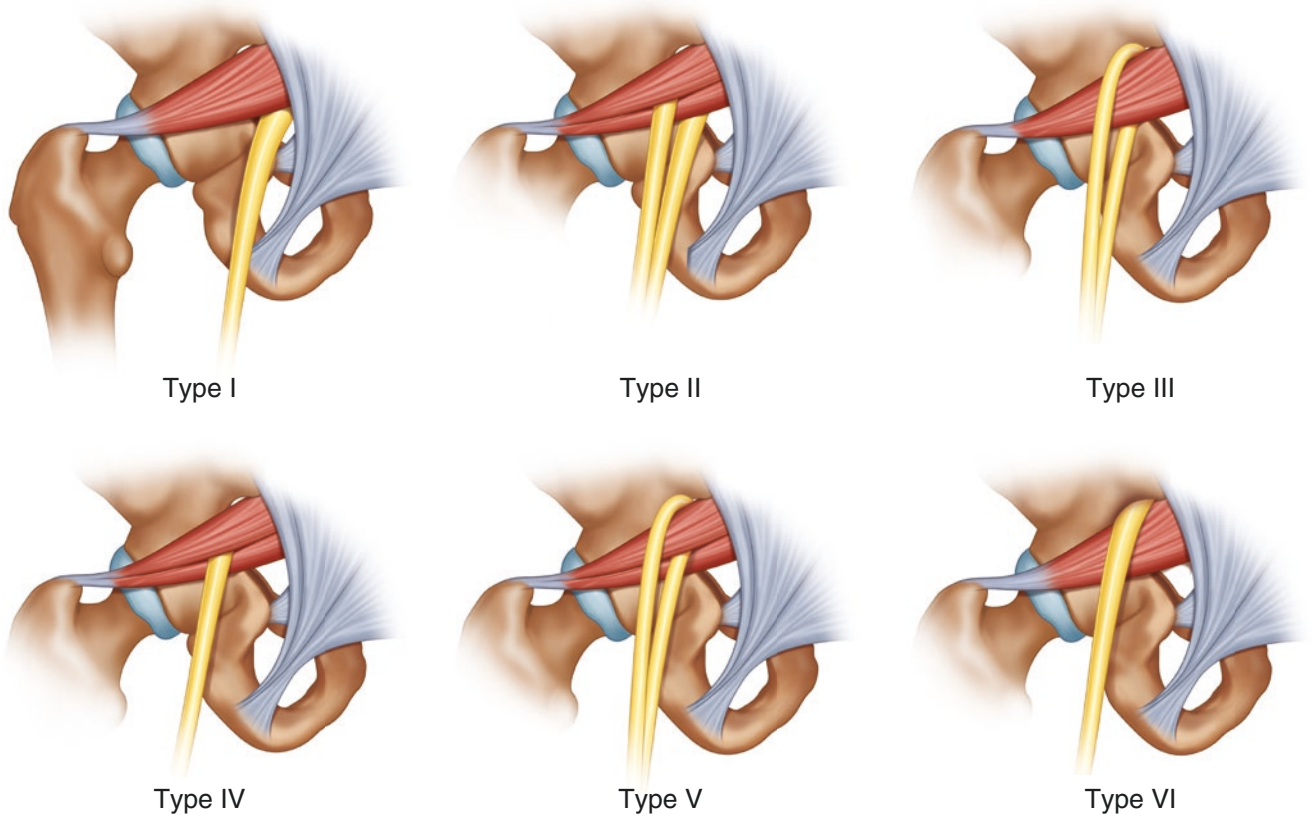

Fig. 51.2 Six routes by which the piriformis exits the pelvis (Reproduced from Natsis et al. [20]. With kind permission from Springer Science and Business Media)

Table 51.1 History and physical exam

History	
HPI	Pain increased on sitting (100%), sciatica (100%), paresthesia, or numbness (2.2%)
Physical exam	
Inspection	Sausage-shaped mass (2.75%), gluteal atrophy (0%)
Palpation	Tenderness over greater sciatic notch (100%)
Neurological exam	Sensory deficit (1.65%), diminished motor (0%), diminished ankle jerk (1.10%)
Special testing	Piriformis sign (51.64%) – ipsilateral external rotation of affected leg noted in supine patient
	Lasegue sign (100%) – practitioner raises affected straight leg with patient supine. Pain elicited at 30–70°
	FAIR (93.41%): flexion adduction internal rotation of affected extremity. High specificity and sensitivity when used in combination with functional electromyography [1]
	Freiberg (84.07%) – forceful internal rotation of the affected side while patient supine to stretch the irritated piriformis and cause sciatic nerve compression
	Pace (55.49%) – resisted hip abduction in seated position elicits pain
	Beatty (51.65%) – abduct leg in sideline position causes pain in the buttock not low back

Table 51.2 Treatment for piriformis syndrome

Physical therapy	The goal of therapy is to relax the spastic piriformis. Wyss describes five phases of rehabilitation: (1) decrease pain and swelling, (2) restore ROM and normal arthrokinematics, (3) strength training, (4) neuromuscular control and proprioceptive training, (5) functional- or sport-specific training [24]
Yoga	Fishman et al. suggest seven yoga poses: Janusirsasana, Matsyendrasana, Parivrtta, Trikonasana, Parivrtta Parsvakonasana, Garudasana, Gomukhasana, Kapotasana [23]
Osteopathic manipulation	Kirschner et al. describe how osteopathic manipulation can be a useful treatment adjunct [19]. Osteopathic maneuvers can be categorized as direct or indirect, with many treatment techniques falling under each category
	Indirect treatment involves holding a structure in a position of ease (in all six planes in the case of the hip joint), balancing it in all planes of motion, and allowing the tissues to unwind. For a patient with a tight piriformis, if the hip is extended, the leg will be externally rotated and treated in this position. If the hip is flexed, the leg will abduct; treatment will be rendered in this position
	Direct treatment involves bringing a structure into its barrier and then treating using operator force. Direct is more painful than indirect as the patient has difficulty doing this motion. With hip extension, a patient with a tight piriformis will be brought into internal rotation to treat. With hip flexion, the patient will be brought into FAIR position
Acupuncture	Various acupuncture techniques have been described for pain reduction in piriformis syndrome
	Instant analgesic affect described by treating the Ashi point [25]
	Round-sharp needle of new nine-needle may be more effective in pain reduction and is better than the ordinary elongated needle [26]
	Centro-square needling [27] and triple puncture with the bai hu yao tou maneuver [28] techniques have also been described
Botox injection	Kirschner et al. did a literature review regarding botox for piriformis syndrome and found that there was a significant improvement in pain reduction using the visual analog scale; one study showed a decreased signal intensity on MRI [29]
	Aside from pain relief, an MRI evaluation of muscle morphology after botox injection revealed that botox leads to atrophy and fatty degeneration of the piriformis muscle and concluded that these factors explain why the botox injections are effective in the treatment of piriformis syndrome [30]
Steroid injection	Corticosteroid injections using ultrasound [31, 32], EMG verification [33, 34], and CT guidance [35, 36] have been shown to be beneficial for pain reduction
Surgery	Arthroscopic release has been described for entrapment neuropathies and drainage of a perineural cyst [37, 38]

Table 51.3 When to refer

Exam or imaging reveal	Refer to
Piriformis spasm causing pain despite therapy, manipulation, acupuncture, exercises	Physical Medicine and Rehabilitation (Physiatry), neurology, sports medicine
Sudden-onset weakness, neurological deficits	Neurosurgery, orthopedics
Imaging revealing tumor, abnormal hip pathology, abnormal anatomical variances	Orthopedics, oncology, OBGYN

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