CASE REPORT

PIRIFORMIS SYNDROME RESULTING FROM AN ANOMALOUS RELATIONSHIP BETWEEN THE SCIATIC NERVE AND PIRIFORMIS MUSCLE

S. Ozaki, MD
T. Hamabe, MD
T. Muro, MD

Piriformis syndrome has been described as an abnormal condition of the piriformis muscle characterized by signs and symptoms due to sciatic nerve entrapment at the greater sciatic notch. This syndrome is a rare and disputed entity; its valid diagnosis has become less common and generally is considered only after other causes of sciatica have been excluded.

It is well-known that there are anatomical variations in the relationship between the sciatic nerve and the piriformis muscle. Some authors have ascribed a causative factor in piriformis syndrome to these abnormal anatomical conditions with surgical exposure.1,2

This article reports a case of piriformis syndrome with an uncommon anomalous relationship between the sciatic nerve and piriformis muscle.

CASE REPORT

A 22-year-old woman presented in November 1994 with low back pain of 1 week’s duration. The pain radiated down the right leg to the lateral aspect of the foot and was particularly aggravated by forward bending.

On examination, deep tendon reflexes were normal bilaterally. The patient reported muscle weakness in the right great toe extensors. There was no gross muscle atrophy of the lower extremities. Straight-leg-raising test was positive at 70°. Hypoesthesia and numbness were noted at the distribution of the S1 nerve root.

A myelogram revealed minimal anterior indentation of the dura mater at the L5-S1 level, and a diskogram showed mild posterior protrusion of the contrast material without pain provocation (Fig 1).

A right S1 nerve root block with betamethasone provided transient symptom relief. Based on the clinical findings and the patient’s desire for a rapid recovery from her discomfort, in December 1994, nucleotomy was carried out by hemilaminectomy of the right side of the L5 lamina, and a mild disk protrusion was found.

After surgery, her symptoms did not improve, except for the low back pain. This result made it more difficult to establish the cause of her symptoms. Over the next 9 months, the patient’s symptoms progressed, and other characteristic clinical signs associated with piriformis syndrome developed: they were observed with further careful examination as follows.

There was sensory loss along the distribution of the posterior cutaneous nerve of the thigh. Distinct tenderness over the piriformis muscle was elicited. The patient’s discomfort was increased by right hip flexion, abduction, and external rotation with pain, although neither Pace’s sign (pain and weakness on resisted abduction-external rotation of the thigh)3 nor Freiberg’s sign (pain on forced internal rotation of the extended thigh)4 were positive. On rectal examination, there was severe tenderness and reproduction of pain by digital pressure over the piriformis muscle on the right posterolateral pelvic wall.

Computed tomography (CT) and magnetic resonance imaging (MRI) demonstrated a hypertrophic piriformis muscle on the right side (Fig 2). The dramatic and immediate relief of pain by infiltration of local anesthetics using a nerve stimulator into the sciatic nerve over the greater sciatic notch also was considered a reliable diagnostic sign. However, the results of electromyography and a nerve conduction velocity study, digital subtraction angiography, and bone scintigraphy of the entire skeletal system were all nonspecific.

Based on these clinical findings, a second operation was performed in September 1995 to explore the lesion around the greater sciatic notch. The sciatic nerve bifurcated into two main branches at the intrapelvic level, i.e., the
tibial nerve and common peroneal nerve. Both nerve branches emerged from just above the piriformis muscle with the posterior femoral cutaneous nerve (Fig 3) and were squeezed between the upper border of the piriformis muscle and the bony dome of the greater sciatic foramen, especially when the hip was abducted, flexed, and rotated externally. The nerves appeared wasted and atrophic by persistent pressure. The piriformis muscle was resected from the greater trochanteric insertion to the lateral edge of the sacrum.

Postoperatively, the patient’s symptoms gradually subsided, except for sensory loss of the posterior aspect of the thigh, and she started working as a nurse 1 year later without any recurrence of pain.

**DISCUSSION**

Piriformis syndrome is a rare entrapment neuropathy in which the sciatic nerve is compromised by the piriformis muscle. In 1924, Yoeman first mentioned the piriformis muscle in connection with his theory that some cases of sciatica were due to arthritic change in the sacroiliac joint. In 1947, Robinson described two clinical cases and first coined the term “piriformis syndrome.”

The sciatic nerve is vulnerable to entrapment neuropathy as it crosses over the sciatic notch leaving the pelvis, but the etiology of the lesion producing the symptoms can be confirmed only with surgery. Anatomical variations exist in the relationship between the sciatic nerve and the piriformis muscle in a significant percentage of the population, and many authors have proposed links between symptoms of piriformis syndrome and such anatomical variations.

Pecina found that in 6.1% of 130 anatomical specimens examined, the common peroneal nerve passed between the tendinous parts of the piriformis muscle. He considered this variation to be of practical significance for the development of piriformis syndrome. Moreover, he found high-level division (intrapelvic division of the sciatic nerve) in 28.5% of the same specimens. He believed that sciatic nerve compression occurs when the piriformis muscle is stretched during internal rotation of the hip joint with the anatomical variation in patients whose sciatic nerve passes through the tendinous portion of the piriformis muscle.

Beaton and Anson reported variations in the relationship of the sciatic nerve and the piriformis muscle in 240 specimens. They described six possible nerve/muscle arrangements: 1) unidivided nerve below unidivided muscle, 2) divisions of nerve through and below divided muscle, 3) divisions above and below divided muscle, 4) unidivided nerve between heads, 5) divisions between and above heads, and 6) unidivided nerve above unidivided muscle. The last two arrangements were not observed among their anatomical specimens and were considered hypothetical.

Many authors have since reported on the incidence of each variation of anatomical arrangement in similar cadaver studies, but none have observed the arrangement wherein the sciatic nerve passes above the piriformis muscle. However, in 1993, Saysyon et al. reported the first case of sciatica resulting from an inflamed piriformis muscle lying anterior to the unidivided sciatic nerve by surgical exposure. Although this was the first case represented clinically, Lee and Tsai, in a study of the relationship between the sciatic nerve and piriformis muscle in 168 cadaver dissections, had already encountered 5 specimens in which the unidivided sciatic nerve had passed above the unidivided muscle.

Accordingly, the sciatic nerve passage above the piriformis muscle is extremely uncommon, and it is not hypothetical but actual. In the present case, sciatica resulted from an unidivided piriformis muscle lying anterior to the divided sciatic nerve, which has not been reported previously in either the clinical or anatomical literature.

Pecina discovered that nerve compression could only be produced if the nerve was passing through the tendinous portion of a stretched piriformis muscle. In such cases, compression of the nerve occurs during internal rotation of the thigh. In our patient, sciatic nerve compression was most likely to occur between the superior border of the piriformis muscle and the superior margin of the greater sciatic foramen during flexion, abduction, and external rotation of the thigh. The location of the sciatic nerve completely posterior to the piriformis muscle may be the reason our patient did not have positive responses for either Friberg’s or Poe’s sign.

**REFERENCES**