

# Unusual Relationship between the Piriform Muscle and Sciatic, Inferior Gluteal and Posterior Femoral Cutaneous Nerves

Relación Inusual entre el Músculo Piriforme y los Nervios Isquiático, Glúteo Inferior y Cutáneo Femoral Posterior

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**SUMMARY:** Piriformis muscle syndrome has been increasingly recognized as a cause of leg pain. Overuse, strain, or anatomical variations of the relationship between the nerve and the piriformis muscle are thought to be the underlying causes of the entrapment of the sciatic nerve. We report a variation not previously described which was found during a routine dissection. During routine dissection of the left gluteal region of an adult male cadaver we observed a high division of the sciatic nerve and the presence of an accessory piriformis muscle. The sciatic nerve divided beneath the piriformis muscle and the common fibular nerve passed over the accessory piriformis muscle, whereas the tibial nerve reflected anteriorly to pass between the accessory piriformis and the superior gemellus muscle. Additionally, both nerves communicated with a side branch under the inferior border of the accessory piriformis muscle and the inferior gluteal nerve originated from the fibular nerve. Anatomical variations in the relationship between the piriformis muscle and the sciatic nerve may be present in up to 17% of the population. Six different variations have been described and none of them is similar to our description. Though complete understanding of the physiopathology of the piriformis muscle syndrome remains to be elucidated, knowledge of the possible anatomical variations may be useful for its adequate diagnosis and treatment.

**KEY WORDS:** Inferior gluteal nerve; Sciatic nerve; Piriformis muscle.

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## INTRODUCTION

Anatomical variations between the piriform muscle and sciatic nerve and its consequences in clinical practice have been described by several authors (Cassidy *et al.*, 2012; Smoll, 2010; Güvencer *et al.*, 2008; Papadopoulos & Khan, 2004; Benzon *et al.*, 2003). Anatomic variations between the piriform muscle and the inferior gluteal nerve has also been described by some authors (Mandiola *et al.*, 1986; Gabrielli *et al.*, 1997). These anatomical descriptions provide accurate information on the morphology and the topographic relationships between these structures, very significant because these descriptions are of great importance for clinical practice. Thus, in this case report, an anatomical variation not yet found in the literature is described equally in relation to nerves and to the piriform muscle.

## CASE REPORT

During routine dissection in the Anatomy Laboratory of the Department of Human Structural Topography, Medical

School, Universidade de São Paulo (USP) a 58-year-old Caucasian male cadaver, weighing 70 kg, 1.70 cm height, was found with an unusual anatomical variation. No information of muscular or neurological disease was found in his medical history. On inspection no signs of previous surgery, muscle lesion or atrophy in the lower limb were found.

The dissection proceeded as follows: cadaver was positioned in the ventral decubitus position. The skin of gluteal region, the subcutaneous tissue and the gluteus maximums muscle were pulled apart by a longitudinal incision on the lateral portion, leaving these structures medially fixed. The vascular and nervous pedicle was dissected carefully in order to preserve sciatic, posterior femoral cutaneous and inferior gluteal nerves. These findings were recorded by a Nikon D40 camera.

Initially, the sciatic, posterior femoral cutaneous and inferior gluteal nerves were found emerging from the bottom edge of the piriform muscle. However, it was observed that in this region, the gluteal inferior nerve received a branch

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originating from the lateral portion of the sciatic nerve (common peroneal). Therefore, it was decided to expand the dissection, and piriform muscle at its origin was dissected and it was possible to observe the following: 1. In the depth of the piriform muscle, an accessory piriform muscle was found; 2. This deep accessory piriform muscle showed on its superficial face, the common peroneal and the inferior gluteal nerve simply emerging from this peroneal branch, both emerging from the top edge of this muscle; 3. Also, the tibial branch and posterior femoral cutaneous nerve emerged from the bottom of the deep accessory piriform muscle (Fig. 1).

## DISCUSSION

The knowledge of anatomical variations is particularly important in clinical practice, especially in radiological diagnoses and surgical procedures. This case report shows an anatomical variation of the piriform muscle and its relationship to the sciatic, inferior gluteal and posterior femoral cutaneous nerves. Beaton & Anson (1937) in a study with 6,000 cadavers described 6 types of anatomic relationship between the sciatic nerve and piriform muscle, but none of these types was similar to our findings. Small showed that in 7% of cases, the sciatic nerve was divided into a branch perforating the piriform muscle and, other passing inferior to the piriform muscle. Jawish *et al.* (2010) showed the frequency of these six kinds of anatomical relationship. Cassidy *et al.*, described a variation where the

sciatic nerve emerged from the bottom edge of the piriform muscle, however, an accessory piriform muscle located inferior to that muscle passed between the tibial and common peroneal portion of the sciatic nerve. The findings of this study are different from those found by Cassidy *et al.*, because the common peroneal portion and inferior gluteal nerve emerged from the top edge of this deep accessory muscle, whereas the tibial and posterior femoral of the thigh emerged from the bottom edge of this piriform muscle. Our study is partly in accordance with Gabrielli *et al.*, in that a high division of the sciatic nerve may lead the inferior gluteal nerve to have the same path dividing the common peroneal; in our findings, the inferior gluteal nerve emerged together with the common peroneal branch in the upper border of the deep accessory piriform muscle. Anatomic variations in muscles and nerves with abnormal origin, course and distribution may explain muscle pain (myalgia), and neuropathies. Thus, it is of great clinical importance the knowledge of possible anatomic variations that may affect the gluteal region.

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**RESUMEN:** El síndrome del músculo piriforme se ha reconocido cada vez más como una causa de dolor en los miembros inferiores. Tensión excesiva o variaciones anatómicas del nervio y

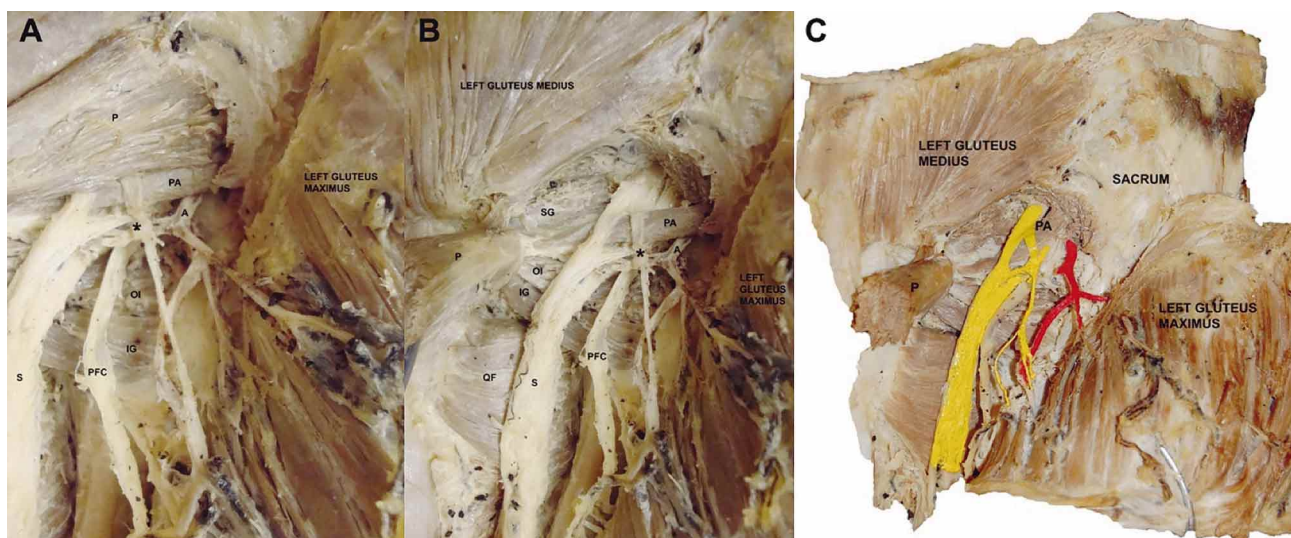


Fig. 1. Left gluteal region in A and B: piriform muscle (P); piriform accessory muscle (PA); artery (A); obturator internus muscle (OI); superior gemellus muscle (SG); inferior gemellus muscle (IG); posterior femoral cutaneous nerve (PFC); sciatic nerve (S); quadratus femoris muscle (QF). A. Piriform muscle is over piriform accessory; B. Piriform muscle was raised to observe the nerves disposition. Branches are highlighted by yellow ink in C.

del músculo piriforme se cree son las causas subyacentes de pinzamiento del nervio isquiático. Se presenta una variación no descrita anteriormente. Durante una disección de rutina en un cadáver de sexo masculino, se observó una división más alta del nervio isquiático y la presencia de un músculo piriforme accesorio. El nervio isquiático se dividía bajo el músculo piriforme y el nervio fibular común pasaba sobre el músculo piriforme accesorio. Por otra parte, el nervio tibial cruzaba entre los músculos piriforme accesorio y gemelo superior. Además, ambos nervios se comunicaban con un ramo lateral bajo el margen inferior del músculo piriforme accesorio y el nervio glúteo inferior se originaba desde el nervio fibular. Variaciones anatómicas y relaciones entre el músculo piriforme y nervio isquiático pueden estar presentes hasta en el 17% de la población. Seis variaciones diferentes se han descrito en este artículo y ninguna es similar a nuestra descripción. A pesar del completo entendimiento de la fisiopatología del síndrome del músculo piriforme, aún queda por esclarecer y conocer las posibles variaciones anatómicas que pueden ser útiles tanto para su diagnóstico como para el tratamiento adecuado.

**PALABRAS CLAVE: Nervio glúteo inferior; Nervio ciático; Músculo piriforme.**

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