Previously Unreported Sciatic Nerve Variation: Case Report

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Summary: The sciatic nerve typically follows its course through the greater sciatic foramen, below the piriformis muscle, and down the posterior aspect of the thigh, but many anatomical variations exist. Herein, we report an unusual relationship between the sciatic nerve and piriformis muscle in which the split common fibular nerve went through the piriformis and had a variant communication with the tibial nerve. To our knowledge, this anatomical variation has not been previously reported. Such variants are important to fully understand pathologies involving the sciatic nerve.

Keywords sciatic nerve, anatomy, anatomical variations, cadaver, tibial nerve, common fibular nerve

INTRODUCTION

The sciatic nerve is the largest nerve in the body, and it originates from the lumbosacral plexus comprised of nerve roots L4-S3. It exits the pelvis through the greater sciatic foramen, as it passes distally below the piriformis muscle. The nerve will continue posteriorly and inferiorly giving innervation to the posterior compartment of the thigh until it reaches the popliteal fossa. At this point, the sciatic nerve will bifurcate giving rise to the tibial and common fibular nerves [1]. Many studies have shown a great deal of variation in this nerve, which may be an important consideration during surgery and cases involving sciatic nerve compression in the gluteal area [2].

Case Presentation

An adult male cadaver aged 87 years at death was found to have a left-sided sciatic nerve bifurcation at the piriformis muscle. The tibial component traveled through the greater sciatic foramen, below the piriformis muscle, and the common fibular passed through the piriformis muscle (Fig. 1). Additionally, the common fibular component of the sciatic nerve was split into two separate parts, medial and lateral, as it exited the piriformis muscle. The more medially placed tibial nerve was also found to contribute two small nerve branches, one that joined the medial part of the split proximal common fibular nerve and the other which descended about 6 cm before reuniting with the posterior aspect of the tibial nerve (Fig. 1). These two small branches arose from a common trunk from the posterior aspect of the tibial nerve and consisted of a larger more proximal part (joining the split medial part of the common fibular nerve) and a smaller more distal part that reunited with the more distally located tibial nerve.

The sciatic nerve on the right side had a normal course without anatomical variations. No pathological conditions or signs of previous injury or surgery were identified in the regions dissected. On the left side, no signs of muscle atrophy were noted in the muscles in-
DISCUSSION

The course of the sciatic nerve has shown a great deal of variation across a number of anatomical studies. Pokorny et al. [3] reported variation in about 20% of cases, while the other 80% of cadavers had the sciatic nerve exiting the pelvis below the piriformis. In 14.3% of cadavers, he noted that the sciatic nerve divided above the piriformis with one branch passing below the piriformis and the other passing through the muscle, similar to the case presented in this study. He also observed cases with the sciatic nerve passing through the piriformis (2.2%) with one branch exiting above the piriformis and the other passing below (4.4%) [3]. Guvencer et al. examined 50 gluteal regions and found similar degrees of variation in the sciatic nerve. These authors noticed the common fibular nerve passed through the piriformis and the tibial component passed under the piriformis in 16% of their specimens, consistent with the amount of variation in another 2009 study with about 17% of muscles splitting the sciatic nerve [4,5]. Natsis et al. observed variation in the sciatic nerve in 6.4% of the 275 limbs examined, which is less than most other studies. Haladaj et al. identified this variation in 20% of the 30 lower limbs examined, more consistent with previously reported amounts of variation [6,7].

These variations can have clinical implications and knowing the possible routes of the sciatic nerve may be useful for physicians/surgeons. A recent meta-analysis suggested that these variations do not necessarily relate to piriformis syndrome, but the variations may have a role in the pathogenesis of a number of other disorders related to the gluteal region [8]. They may also prove useful during surgical procedures in the gluteal region, especially with decompression of the nerve for pain relief [6,9]. Imaging has been an effective tool for recognizing and diagnosing patients with these variations, allowing for the appropriate course of treatment [10].

In order to more clearly define and discuss the variants of the sciatic nerve at the piriformis, Beaton and Anson [11] created the following classification:

Type I-normal course of the sciatic nerve inferior to the piriformis muscle.

Type II-splitting of the nerve with the common fibular part passing through the muscle and the tibial part traveling inferior to it.

Type III-splitting of the nerve with the common fibular part passing superior to the muscle and the tibial part traveling inferior to it.

Type IV-the entire nerve traveling through the muscle.

Type V-splitting of the nerve with the common fibular part passing superior to the muscle and the tibial part traveling through it.

Type VI-the entire nerve passing superior to the piriformis muscle.

Although most sciatic nerve variants will fall into one of the above classifications, the study of Natsis et al. [6] found 4 sides from 240 sides with sciatic nerve variants that did not fit any of these types. These four

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**Fig. 1.** Posterior view of the left-sided dissection of the gluteal region with the cadaver in the prone position. The gluteus maximus is dissected and retracted medially. The common fibular nerve is split into two separate parts, medial (white arrowheads) and lateral (black arrowheads), as it exited the piriformis muscle. The more medially located tibial nerve gives a branch from its posterior aspect (yellow arrowheads), which consisted of a larger part that joins the split medial part of the common fibular nerve (white arrow) and a smaller part that reunites with the more distally located (about 6 cm) tibial nerve (yellow arrow) to contribute.

CFn, common fibular nerve; Tn, tibial nerve
sides, however, did not include a case similar to ours.

Lastly, Chiba et al. [12] investigated the relationship of the sacral plexus and piriformis in 224 adult cadavers. The lower the superior border of the origin of the piriformis, the more frequently perforating nerves through the piriformis were observed. Although they suggested 13 different perforating patterns, our finding did not match any of those.

CONCLUSION

The sciatic nerve has a large number of variations and understanding these is important in the diagnosis and treatment of pathologies involving this nerve [13-15]. To our knowledge, the variant described here has not been previously reported.

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