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Case Report

A Case Report on Unusual Sciatic Nerve Anatomy

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ABSTRACT

The sciatic nerve, the largest nerve in the human body, originates from the lumbosacral plexus and is essential for lower limb innervation. Its typical course beneath the piriformis muscle is important for understanding clinical conditions like sciatica and piriformis syndrome. Anatomical variations in the nerve's pathway can result in compression syndromes, particularly related to anomalies in the piriformis. Understanding these relationships is crucial for accurate diagnosis and effective treatment, ultimately enhancing patient outcomes for lower limb and pelvic pain.

Keywords: *Unusual Sciatic, piriformis muscle, cadaveric.*

INTRODUCTION

The sciatic nerve, the thickest nerve in the body, originates from the ventral rami of the fourth lumbar to third sacral spinal nerves. It enters the thigh through the greater sciatic foramen, typically below the piriformis muscle, and innervates the posterior compartment of the thigh.

As it descends, the sciatic nerve eventually bifurcates into the tibial and common peroneal nerves, usually at the level of the knee. The common site for this bifurcation is at the junction of the middle and lower thirds of the thigh or at the apex of the popliteal fossa. Although the tibial and common peroneal nerves are structurally distinct, they remain loosely bound together within the sciatic nerve until their separation. This anatomical arrangement is essential for understanding both the nerve's function and potential clinical implications, such as sciatica or other nerve-related conditions1.

The level and pattern of this bifurcation exhibits considerable anatomical variation. The division may happen within the pelvis or even in the popliteal fossa itself. Additionally, the tibial and common peroneal nerves may also exhibit different pathways or relationships with surrounding structures. Understanding these variations is crucial for clinical assessments and surgical interventions related to sciatic nerve injuries or conditions.

METHODOLOGY

The gross dissection of the lower limb including the gluteal region, back of thigh and leg was done following the Cunningham manual in the Department of Anatomy, BGS GIMS.

Observations:
During routine cadaveric dissection of the lower limb, it was observed that the right sciatic nerve displayed an atypical bifurcation pattern, emerging as two distinct divisions—one above and one below the piriformis muscle. This is described as type 3 in the Beaton and Anson classification. Despite this unusual separation, the two divisions maintained a common trajectory into the popliteal fossa. Once within the fossa, they then separated into the tibial and common peroneal nerves, proceeding along their typical anatomical courses. This variation highlights the complexity of sciatic nerve anatomy and underscores the importance of recognizing such differences for clinical assessments and potential surgical interventions.

DISCUSSION

The sciatic nerve is the largest nerve in the human body, originating from the lumbosacral plexus (specifically from the L4 to S3 spinal nerves). It runs from the lower back, through the pelvis, and down the back of each leg.

The relationship between the piriformis muscle and the sciatic nerve can exhibit various anatomical variations, each with potential clinical implications, especially concerning sciatica and other neuropathies. Here's a concise description of the six variants originally described by Beaton and Anson2.

a) Type-1: undivided nerve below undivided muscle
b) Type-2: divisions of nerve between and below undivided muscle
c) Type-3: divisions above and below undivided muscle
d) Type-4: undivided nerve between heads
e) Type-5: divisions between and above heads
f) Type-6: undivided nerve above undivided muscle

The interactions between the sciatic nerve and the piriformis muscle based on their embryological development is quite intriguing.Since the sciatic nerve forms earlier than the piriformis muscle, any variations in the latter's development could indeed affect how it interacts with the sciatic nerve, potentially leading to clinical issues such as piriformis syndrome3.

In a study involving 56 lower limbs, it was found that a significant majority (93%) exhibited a typical anatomical configuration of the sciatic nerve, indicating that standard anatomical relationships are common4.

Another study on 51 cadavers, 102 lower limbs, found that 89%, of lower limbs examined contained normal anatomy with the sciatic nerve passing under the piriformis muscle. The most common variation in the morphology of the sciatic nerve was Type 2, according to Beaton and Anson's classification, found in 8.8% of the lower extremities examined. The only other variation identified was Type 3 variation, occurred in 2.9% of the lower limbs examined5.

Routine anatomical dissection on 80 lower limbs of the 40 embalmed cadavers noted that relationships between sciatic nerve and piriformis muscle were of type A in 82.50%, type B in 8.75%, type C in 5.0%, type D in 2.5% and rare type G in 1.25%6.

A case report details of a bilateral B-type variation of the sciatic nerve (SN) per the Beaton and Anson classification, where the common peroneal division exited through the piriformis muscle, and the tibial division emerged below it7.

Another case report describes of an anatomic abnormality found during a routine cadaver dissection involving the bilateral presence of a double piriformis, absence of sciatic nerve formation (tibial and common fibular nerves never within a shared sheath) and an atypical course of the inferior gluteal vessels perforating the right tibial nerve during a routine cadaver dissection8.

A study has observed thatunilateral anatomical changes are more prevalent on the left side (12%) compared to the right side (8%), and are more common in females (12.5%) than in males (7.69%)9.

Anatomical variations are usually identified during routine dissection and a registry of anatomical variations encountered during practice may enhance best care and prevent any confusion about those variations 10.

A thorough knowledge of the relationship between the sciatic nerve and the piriformis muscle is vital for accurate diagnosis and effective treatment, enhancing outcomes for patients with lower limb and pelvic pain.

CONCLUSION

Anatomical variations of the sciatic nerve are not uncommon and are often noticed during routine dissections or surgical procedures. Documenting these findings and maintaining a record of such variations can help avoid confusion and improve clinical safety. The pattern of division of the sciatic nerve, particularly in relation to the piriformis muscle, has important implications for diagnosis, surgical planning, and pain management. Further studies exploring the factors that influence these variations will add valuable insight to both anatomy and clinical practice. A sound understanding of the sciatic nerve's division pattern and its relationship with the piriformis muscle ultimately helps clinicians make safer, more informed decisions and achieve better outcomes for their patients.

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