



Variations in the Anatomy of the Sciatic Nerve and its Clinical Implications

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Introduction

The Greek term "sciatic" comes from the Latin "Ischiadicus." The sciatic nerve, a vast nerve found in humans and other animals, is also known as the ischiadic nerve or the ischiatic nerve. It's the biggest and longest nerve in the human body. There are really five nerves that make up the sciatic nerve. These curves develop on both the right and left sides of the lumbar spine. This originates in the lower lumbar spinal neurons (L4-S3). Both the anterior and posterior branches of the lumbosacral plexus are represented in its network of nerve fibres. Each side of the lower spine has a branch of this nerve that travels deep into the gluteal area, down the back of the thigh, and into the foot, so linking the spinal cord to the muscles of the legs and feet. Nearly all of the skin, muscles, and tendons of the leg and foot are supplied by this structure. The sciatic nerve typically divides into the tibial nerve (TN) and the common peroneal nerve (CPN) near the apex of the popliteal fossa (PF) (CPN). Sciatica is a painful condition brought on by the sciatic nerve being pinched or irritated. Sciatic nerve discomfort, numbness, tingling, and weakening are the symptoms. Depending on the location of the sciatic nerve compression, this may entail an inability to walk. To diagnose nerve pathology, doctors often undertake a CT scan, MRI, electromyography (EMG), nerve conduction study, and blood tests.

The purpose of this study was to characterise and statistically assess sciatic nerve variation. While exploring the sciatic nerve surgically, it is important to keep in mind the fact that the amount of bifurcation might vary from patient to patient. This paper will offer clinical importance and some related prior investigations. Surgeons need to pay close attention to this because of how often things vary.

Muscle rudiments have been found in a wide variety of human body locations, and even certain muscles that are often only seen in the lowest of animals have been occasionally recognised in man, albeit in a severely attenuated form. The less common "Rectus sternalis muscle" is also correct.

Materials and Methods

During a two-year period, 100 gluteal areas were evaluated in 50 formalin-fixed cadavers with no disease. There were forty-five male cadavers and five female cadavers. The Gluteus maximus was raised in order to investigate the piriformis and sciatic nerve. The position of the SN, its egress from the pelvis, and the level of the SN division were all noted after the correct exposure. In 80-90% of people, the sciatic nerve bifurcates at the superior angle of the popliteal fossa.

Results

Ten cadavers, including seven men and three women, showed SN bifurcation variations. The sciatic nerve was divided differently in the legs of six different individuals. The sciatic nerve in a male cadaver's left lower extremity split at the pelvis, the CPN nerve exited through the bifid piriformis, and the TN nerve erupted from beneath the muscle. Both of the limbs of the male cadaver were of different lengths. The right sciatic nerve split near the ischial tuberosity, whereas the left sciatic nerve split in the pelvis, with the tibial and common peroneal nerves emerging below the piriformis muscle. Bilateral variance was detected in a male cadaver. It was determined that the right sciatic nerve split around 50 millimetres above the popliteal crease (0-150 mm) and below the superior angle of the popliteal fossa. At the popliteal crease, the sciatic nerve branches out to the left. On the right side of a female corpse, the sciatic nerve split at the pelvis. The common peroneal nerve (CPN) came out above the piriformis, and the tibialis posterior (TN) came out below the muscle.

Discussion

There is widespread agreement across anatomy, orthopaedic, and surgical textbooks that the sciatic nerve bifurcation levels are clinically and therapeutically relevant. The SN exits the body through the larger sciatic foramen below the piriformis muscle and separates at the top of the popliteal fossa approximately 85–89% of the time. Phylogeny and the evolution of the sacral plexus are important factors to examine when trying to make sense of the limb nerve variations. This investigation expands upon other studies in the literature and stresses again the significance of pinpointing the sciatic nerve bifurcation levels. Neither the right nor the left sex-specific pattern nor the gender-neutral pattern of its bifurcation were considered noteworthy in introductory anatomy books and publications. There is no correlation between a person's stature and the point at which a nerve divides.

One of the male cadavers used in this analysis had a bilateral split of the SN in the popliteal area. When viewed from the front, the SN split 50 mm from the popliteal crease on the right side, and from the front, it split exactly at the popliteal crease on the left. This is a really unusual discovery. The needle is traditionally inserted 100 mm above the popliteal crease to perform a popliteal block. A total of 50 cadavers were used in our research; 45 were male and 5 were female. Only 10 out of 100 cadavers (8%) had significant SN division in the lower extremities, indicating anatomical variance. Reviewing the Piriformis syndrome is necessary since the distinctions in exit pathways for these two nerves are a crucial clinical aetiology of sciatica. The pressure that the supernumerary superior gemellus and piriformis muscles might exert on the SN should be taken into account by doctors. Our cadavers did not exhibit any signs of similar SN subdivisions.

Conclusion

The study concluded that 50 corpses were used in this investigation (100 lower extremities). Ten of the lower limbs showed the most noticeable differences. Even so, pelvic separation is a possibility, albeit an uncommon one. When this occurs, the tibial nerve and the common fibular nerve may emerge from the pelvis at separate points. Non-discogenic sciatica may be the outcome of these variants due to nerve compression under different anatomical structures. The purpose of this research was to determine the boundary between the two SN branches. Eight percent of the people in this research had a high terminal division of the sciatic nerve at the level of the ischial tuberosity or in the pelvis. For clinical purposes, this is something to remember while administering a popliteal block. We propose a new anatomical variant in which the common peroneal nerve (CPN) runs below the piriformis muscle and the piriformis muscle is bifid. Muscle atrophy and pain in the tailbone (piriformis syndrome) may result from anatomical differences. Injections and hip replacement operations frequently include accessing the deep gluteal area. Imaging methods are used for the diagnosis of nerve abnormalities. As reported in the scientific literature, the percentage of human specimens with piriformis and SN abnormalities varies from 1.7% to 32.7%. Pain in the sciatic nerve that shifts with a woman's menstrual cycle is a hallmark symptom of sciatic endometriosis, a disease diagnosed by MRI but otherwise uncommon. A local excision is used to treat it. SN develops a cicatricial alteration if left untreated, necessitating extensive surgery. When doing a below-the-knee amputation, it is crucial to first separate the sciatic artery and then knot without nerve fibres.

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