

Piriformis Syndrome in Relation to Sciatic Nerve Bifurcation in the Gluteal Region

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Abstract

Sciatic nerve is the longest and widest nerve in the human body. It originates from the sacral plexus from L4-S3 spinal nerves in the form of two nerve trunks. Commonly sciatic nerve bifurcates at the apex of the popliteal fossa into Tibial nerve and Common peroneal nerve. In the cadaver, we present a rare variation of bifurcation of the sciatic nerve into Tibial nerve and Common peroneal nerve in the gluteal region passing above the piriformis muscle. This type of human has a great chance of piriformis syndrome, which can cause compression of sciatic nerve by the piriformis muscle leading to non-discogenic sciatica.

Keywords: *Sciatic Nerve Bifurcation; Piriformis Syndrome*

Introduction

The sciatic nerve (SN) is the longest and widest nerve in the human body. It commonly originates from sacral plexus of L4-S3 spinal nerves. It leaves the pelvis through the greater sciatic foramen below the piriformis muscle (PM) and descends between the greater trochanter and ischial tuberosity along the back of the thigh. Commonly at the junction of the middle and lower thirds of the thigh near the apex of popliteal fossa, the sciatic nerve bifurcates into Tibial nerve (TN) and Common peroneal nerve (CPN) in 85% to 89% of individuals [1]. SN gives muscular branches supply posterior compartment of thigh muscles, articular branches to hip joint and knee joint. However, sensory branches supply the leg and foot except anteromedial margin of leg and medial margin of foot. The piriformis muscle (PM) is flat and pear-shaped, originating from the anterior surface of upper three sacral segments, greater sciatic notch, capsule of sacroiliac joint and pelvic surface of sacrotuberous ligament and gets inserts to medial side of the upper border of greater trochanter of femur [2]. The relationship between PM and SN are close and may be changing [3]. In majority of cases, the sciatic nerve passes completely under the PM, in a small portion of cases the undivided nerve may emerge above the muscle or through the muscle. The major divisions of the nerve may lie on either side, above or below the muscle. The differences in the exit of these two branches are important in clarifying clinical etiology [4].

Case Report

During routine dissection of gluteal region for medical undergraduates in Department of Anatomy, School of Medicine, Jinan University. We observed a rare variation of sciatic nerve in left gluteal region in male cadaver of approximate age 60 years embalmed with formalin. In this cadaver the SN divided into CPN and TN in the gluteal region and passed above the PM (Figure 1) and then both the nerves descended

over back of the thigh where it given the muscular branches to the muscles of back of the thigh. After reaching at upper angle of popliteal fossa the course of the CPN and TN nerves are similar in the both of the lower limbs. The course of SN is as usual in right lower limb.

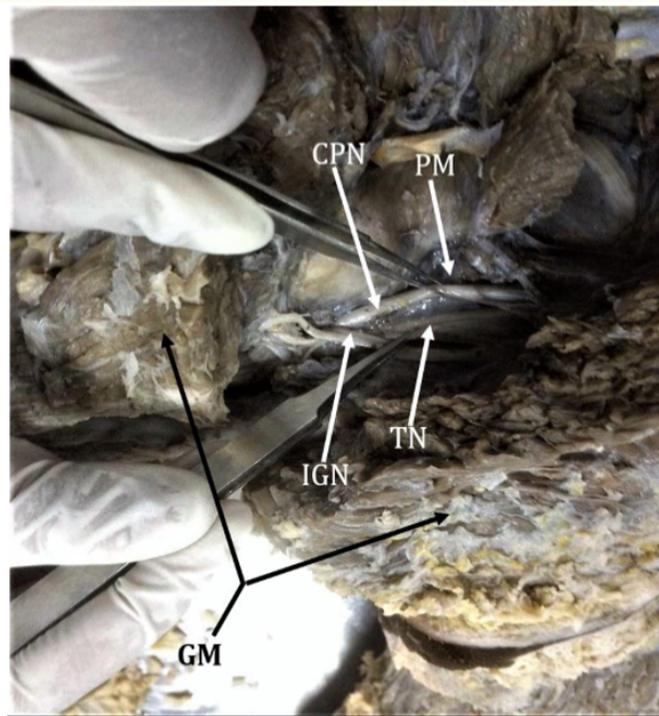


Figure 1: Left gluteal region showing bifurcation of sciatic nerve into Tibial nerve and Common peroneal nerve above the piriformis muscle. GM: Gluteus Maximus; IGN: Inferior Gluteal Nerve; TN: Tibial Nerve; CPN: Common Peroneal Nerve, PM: Piriformis Muscle.

Discussion

Sciatic nerve is the longest and widest nerve in the human body and in the most of the individual it bifurcates at the popliteal region (85 - 89%) [1]. Developmentally the nerves form two plexus for lower limb namely lumbar plexus and sacral plexus at the base of limb bud. As the plexuses grow into the limb, they divide into ventral and dorsal components. The sciatic nerve formation occurs due to the approximation of dorsal and ventral components [5]. Failure of approximation of dorsal and ventral components leads to high division of SN. In present case, the division takes place in gluteal region above the PM. In rare case, the bifurcation may occur anywhere in the sacral plexus and the lower part of the thigh [6]. Higher-level bifurcation can cause an incomplete block of the sciatic nerve during the popliteal block anesthesia. There is a possibility of different anatomic relations between the sciatic nerve or its terminal branches and the piriform muscle leading to piriformis syndrome [7,8] which can cause compression of sciatic nerve by the piriformis muscle leading to non-discogenic sciatica [9].

Piriformis syndrome can cause back and leg pain and the diagnosis done by ultrasound. Suk Ku Han et al study analyzed the diagnostic methods and efficacy of conservative treatments including activity modification, medications, physical therapy, local steroid injections into the piriformis muscle, and extracorporeal shock wave therapy for at least 3 months and surgical treatments for PS [10]. Nazdi H., et al. described after surgery Botox injection given for PS [11]. Mannitol and vitamin B and neural therapy is effective in treatment of PS [12,13]. Beaton and Anson [14,15] classified variations of the piriformis and SN in 120 specimens in 1937 and in 240 specimens in 1938. Their classification, known as the Beaton and Anson classification, is as follows:

- Type 1: Undivided nerve below undivided muscle;
- Type 2: Divisions of nerve between and below undivided muscle;
- Type 3: Divisions above and below undivided muscle;
- Type 4: Undivided nerve between heads;
- Type 5: Divisions between and above heads;
- Type 6: Undivided nerve above undivided muscle.

In the present case the division of sciatic nerve in the gluteal region does not belongs to any type of Beaton and Anson classification. Hence, the variation is unique and the knowledge of different anatomical variations of SN in association with gluteal surgeries suggested as a possible trigger for PS.

Conclusion

Sciatic nerve is the most important nerve in lower limb. It is commonly bifurcated in the popliteal region. In this cadaver, the sciatic nerve bifurcated in the gluteal region passing above the piriformis muscle. This type of variations can cause improper block of sciatic nerve as well as piriformis syndrome, and sciatica.

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