

HIGH AND LOW DIVISION OF SCIATIC NERVE AT DIFFERENT LEVELS IN HUMAN CADAVERS

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Abstract

Background: Anatomical variations of nerves and vessels are commonly seen. Anatomical variants of the Sciatic Nerve in its divisions and relation to piriformis were described many years ago and may have consequences in certain diseases, such as sciatica, and piriform syndrome. Specialised care may be required for these patients due to their unique anatomy. **Aim:** To study the cadaveric anatomical variants of the Sciatic nerve divisions in the pelvis, the gluteal region, the thigh, and the popliteal fossa. **Materials and Methods:** This study was conducted in the Department of Anatomy. A total of 30 lower limbs and gluteal regions of formalin-fixed male and female cadavers were used to study the anatomical variants of the Sciatic nerve division into its terminal branches. Total number of variations noted and tabulated with percentages. **Result:** Out of 30, 1specimens (3.3%), showed division of the sciatic nerve into tibial nerve and Common peroneal nerve in the gluteal region. 1 specimen (3.3%) showed division of the sciatic nerve into tibial nerve and Common peroneal nerve occurred in the upper of the posterior aspect of the thigh. . 1 specimen (3.3%) showed division of the sciatic nerve into tibial nerve and Common peroneal nerve occurred in the middle of the posterior aspect of the thigh. 2 specimens (6.6%), revealed division of the sciatic nerve into a tibial nerve and Common peroneal nerve in the lower part of the posterior aspect of the thigh, and 1 specimen(3.3%)showed division in the popliteal fossa. **Conclusion:** The most common level of bifurcation of the Sciatic nerve in the present study was at the lower part of the posterior aspect of the thigh (6.6%)above the popliteal fossa.

INTRODUCTION

The sciatic nerve is 2 cm wide at its origin and is the thickest nerve in the body. It leaves the pelvis via the sciatic foramen, usually below the piriformis and descends between the greater trochanter and ischial tuberosity, along the back of the thigh, dividing into the tibial and common peroneal nerves. The point of division of the sciatic nerve into its tibial and common peroneal components is much variable. The common site is near the apex of the popliteal fossa but the division may occur above this point and rarely may occur below it(Beaton and Anson 1937). Both the divisions are bounded by a common sheath of connective tissue although that interchange no nerve fibers. Coccygodynia and sciatic pain have been attributed to abnormal relations between the piriformis muscle and the sciatic nerve.^[1,2]

An awareness of Sciatic nerve variants is crucial while performing a total hip arthroplasty,

particularly via the posterior approach, Sciatic nerve blockade and imaging-guided injections. Accurate knowledge of the typical Sciatic nerve anatomy and its variants could prevent complications during procedures and could improve the diagnosis of various pathologies. so knowledge of variation in the division of the sciatic nerve is important in surgical exploration, In addition, higher division of the Sciatic nerve may be the cause of an incomplete block during popliteal block anaesthesia.^[3] The present study noted the incidence of high division and low division of sciatic nerve among the cadavers studied during routine dissection schedules.

Aims and Objectives

To describe the location of the sciatic nerve in the piriformis muscle. To study variations of the level at which sciatic nerve divides into tibial & common peroneal nerves and their types in human cadavers of both sexes. Knowledge regarding the variation of sciatic nerve helps surgeons and anaesthetics while

performing operations and blocks in regions supplied by the sciatic nerve.

MATERIALS AND METHODS

The present study was conducted during routine dissection sessions for 1st-year MBBS students in the Department of Anatomy, ACSR Medical college, Nellore. During dissection, 30 gluteal regions from 15 formalin-fixed adult cadavers [male and female] without nerve pathology were studied for the sciatic nerve course. All human cadavers (14 male and one female) available for dissection during the study period were included. As a routine dissection procedure, the gluteus maximus muscle was reflected to explore the piriformis, superior gemellus, obturator internus, inferior gemellus, and quadratus femoris. After reflection, the observations were noted regarding the location of the sciatic nerve, the exit of the sciatic nerve from the pelvis, and the level of division of the sciatic nerve.

RESULTS

In total 30 lower limbs 24 limbs (80%) have shown the normal pattern of origin of nerve, course in gluteal, back of thigh, popliteal fossa and normal in division.



Figure 1: Showing division in gluteal region

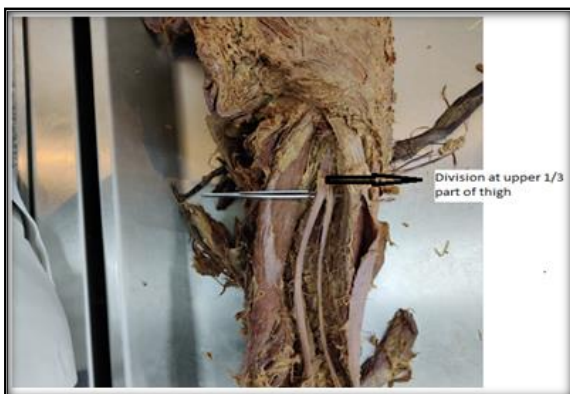


Figure 2: Showing division in upper one third of thigh

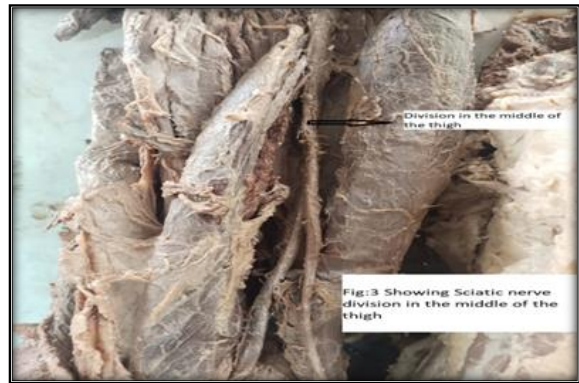


Figure 3: Showing division in the middle of thigh

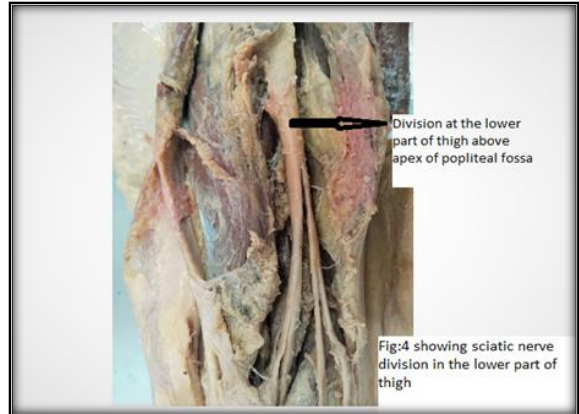


Figure 4: Showing division in lower part of thigh

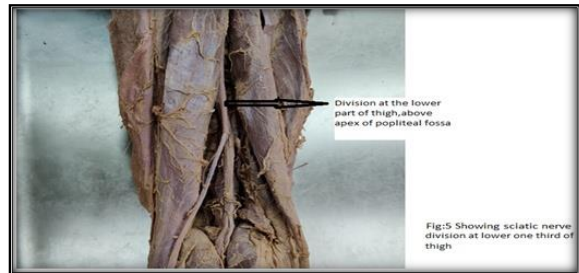


Figure 5: Showing division in lower one third of thigh

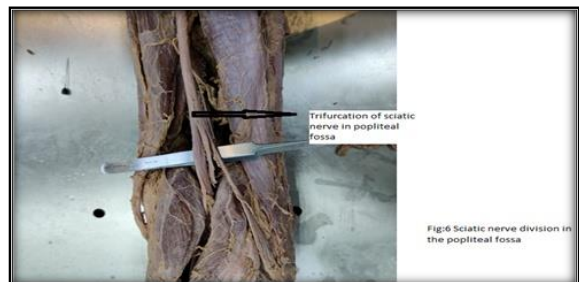


Figure 6: Showing division in popliteal fossa

Six cadaveric limbs have shown variation in their course and division. In one limb sciatic nerve is divided in the lower part of the gluteal region just 3 cm below the piriformis muscle at the level of the inferior gemelli muscles [Figure 1]. In one limb (3.3%) sciatic nerve is divided into two components around 6cm below the lower margin of the gluteus maximus [Figure 2]. In one limb (3.3%) the sciatic

nerve has divided into tibial & common peroneal in the middle 1/3rd part of the thigh [Figure 3].

In two limbs (6.6%) the sciatic nerve has divided into tibial & common peroneal in the lower 1/3rd part of the thigh, just above the apex [Figure 4] and 5cms above the apex of the popliteal fossa [Figure 5] respectively.

In one limb sciatic nerve is divided into 3 components in the popliteal fossa below the apex tibial nerve, common peroneal nerve & sural nerve [Figure 6].

DISCUSSION

It has been written in the literature that the sciatic nerve usually shows many variations in its division, especially its higher division. In the present study both the high and low division of the sciatic nerve are noted, high division occurred in the gluteal, and thigh region while low level in the popliteal fossa.

Batson and Anson classified sciatic nerve division into 4–6 variants as below:^[4]

Type 1: Undivided sciatic nerve below the undivided muscle

Type 2: Division of sciatic nerve between and below undivided muscle

Type 3: Division of sciatic nerve above and below undivided muscle

Type 4: Undivided sciatic nerve between the heads

Type 5: Division of sciatic nerve between and above the heads

Type 6: Undivided sciatic nerve above the undivided muscle.

In the present study, we got 80% of cases are type 1 which is co-related with most of the studies conducted on the sciatic nerve.

Ugrenovic et al,^[5] found high division of sciatic nerve in the posterior region of the thigh and in the gluteal region in 27.5% of cases. The high division may cause an incomplete sciatic nerve blockage during popliteal anaesthesia and may cause piriformis syndrome.

Smoll NR,^[6] (2010) has reported that the prevalence of this high division variation in cadavers was 16.9 % and in surgical cases, series was 16.2% In Nimje et al,^[7] study division of sciatic nerve at the level of upper thigh i.e. at the origin of long head of biceps femoris in 1% of cases. And lower division of the sciatic nerve at the level of knee joint in 2% of cases Prakash AK et al,^[3] documented Sciatic nerve division in the upper part of the back of the thigh in one lower limb, 40.7% division in the lower part of the posterior aspect of the thigh, and 34.9% division in the popliteal fossa, In the present study both this type of divisions were noted.

Low-level division of the Sciatic nerve is rare. Saleh et al,^[8] studied the level of division of the sciatic nerve into the tibial and common peroneal nerve above the popliteal fossa in 30 cadavers and that the sciatic nerve divided at a distance of 50–180 mm from the popliteal crease. Zhon L,^[9] (2014) reported

that the sciatic nerve divided at a range of 40–120mm above the popliteal crease. In the Rajendran et al,^[10] division was noted about 24mm above popliteal crease. This shows that the nerve is divided in the low level of the popliteal fossa. In the present study, the sciatic nerve is divided at 1cm above the popliteal crease.

Nayak S,^[11] (2006) reported a trifurcation of Sciatic nerve in the middle of the popliteal fossa into the tibial nerve, common peroneal nerve and an abnormal trunk. The abnormal trunk was divided into lateral cutaneous nerve of the calf and peroneal communicating nerve. Another case report by Sawant S.P,^[12] (2013) reported bilateral trifurcation of the sciatic nerve in the middle of the popliteal fossa into the tibial superficial, deep peroneal nerves. Birhane Alem Berihu,^[13] study also reported, the Sciatic nerve was trifurcated in the low level of the popliteal fossa into the tibial, common peroneal nerve, peroneal communicating nerve and lateral sural nerve was absent. The popliteal nerve is trifurcated into the tibial, common peroneal and sural nerve in the present study. Variations in the sural nerve and peroneal communicating nerve were noted in many studies. The knowledge of the variation of these nerve is important because the sural nerve is the most frequently used sensory nerve in nerve transplantations.

CONCLUSION

The present study evaluates the incidence of sciatic nerve division in the gluteal, thigh, and with in popliteal fossa and also trifurcation of the nerve. This may help clinicians and surgeons while handling sciatic nerve injuries and also during routine blocks.

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