



## The Variations Of Sciatic Nerve Division:A Case Series In North-East India

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### Abstract

#### Introduction:

Sciatic nerve is the largest and thickest branch of the sacral plexus. It is formed by joining the ventral rami of L4-S3 roots. It is the main nerve of posterior compartment of thigh and terminate into common peroneal nerve and tibial nerve at the apex of the popliteal fossa. Sometimes there is variation in the termination and have different routes. Such variations may lead to compression of the sciatic nerve which leads to non-discogenic sciatica.

#### Method:

The case series of 6 cadaveric specimens were used and study was conducted in RIMS hospital, Imphal, Manipur, India.

#### Result:

In two specimens, the division of the right sciatic nerve is found at higher level above the popliteal fossa. In one specimen, the division of the sciatic nerve is at lower level inside the popliteal fossa in both limbs. In one specimen, the division of the left sciatic nerve at apex of the popliteal fossa with trifurcation in single limb. In two specimens, the right sciatic nerve is observed between two heads of piriformis muscle.

#### Conclusion:

The knowledge in the variation of sciatic nerve division is important to prevent any injury to the nerve during different surgeries in the gluteal region. The variant anatomy of the sciatic nerve may cause piriformis syndrome and failure of sciatic nerve block.

**Keywords:** Sciatic nerve, variation, division, popliteal fossa

#### Introduction

Sciatic nerve is the largest and thickest nerve in the body. It is formed by joining of the ventral rami of L4-S3 roots. It enters the gluteal region through the greater sciatic foramen below the piriformis. It is the most lateral structure emerging through the greater sciatic foramen below the piriformis. It runs downward and slightly laterally under cover of gluteus maximus midway between the greater trochanter and the ischial tuberosity, and enters the back of the thigh at the lower border of the gluteus maximus. Along its course it lies between biceps

femoris and adductor magnus[1]. It is the main nerve of posterior compartment of thigh and terminate into common peroneal nerve and tibial nerve at the apex of the popliteal fossa. Its width is 2 cm at its origin ranging across its length from 1.5 to 2cm. Sometimes there is variation in the termination and have different routes[2,11].

The variations of the sciatic nerve may lead to compression of the sciatic nerve which leads to non-discogenic sciatica and failure of sciatic nerve block is possible. The anatomical knowledge and understanding of the variations are important for the

surgeons during the surgery of gluteal and posterior compartment of the leg. The literature shows that numerous studies have been done on variations of sciatic nerve in different parts of India, but the observations from the North East India are yet to be shared satisfactorily. The present study is carried out to document the observed variations of sciatic nerve in the Department of Anatomy, Regional Institute of Medical Sciences, Imphal, an institute in the North East part of India.

#### MATERIALS AND METHOD:

The present study is a cross sectional study and connected in Department of Anatomy, RIMS hospital, Imphal, Manipur, North East part of India. The case series of six (6) cadaveric specimens were studied. In six cadavers, four were male cadavers and two were female cadavers. The six adult cadavers were dissected from the gluteal region to popliteal fossa and the origin, its exit through greater sciatic foramen were examined. The variation in the level of division in sciatic nerve into common peroneal nerve and tibial nerve were observed.

The specimen was placed in the prone position and linear skin incision was made from the top of iliac crest to the popliteal fossa. The fascia lata was identified and opened in cranial to caudal direction. The overlying gluteal muscle was dissected and the sciatic nerve was identified and the variation in the division level of common peroneal nerve and tibial nerve was studied. Ruler and measuring tape were used for the measurements.

#### RESULT:

Out of six adult cadavers, one male cadaver had variation in the division in bilateral limbs. However in all other cadavers the variation in the origin and the variation in the division were observed only in unilateral limb.

In two specimens, the common peroneal nerve branch of the sciatic nerve was observed between two heads of piriformis muscle in the left side of the lower limb in one specimen and right side in other specimen. In two specimens, division of the sciatic nerve was found at higher level above the popliteal fossa of left leg. In one specimen, the division of the sciatic nerve is at lower level inside the popliteal fossa in both limbs. The nerve that supply the biceps femoris arose at the higher level of gluteal region and the division

of the sciatic nerve was at apex of the popliteal fossa with trifurcation in only left side of the limb. In present study the variations were more observed in the left side of the lower limb than the right lower limb. In only one specimen the variations were observed in bilateral limbs.

#### DISCUSSION:

Anatomical variations in the sciatic nerve had been reported in numerous literature by many authors. Anatomic variations are found in about 30% of cases, as when the nerve is located above or through the piriform muscle or passage of the fibular and tibial nerves separately above and below the muscle [4]. The author Verelst P and van Zundert A observed that the sciatic nerve and the piriformis had an anatomical variation in a 28.13%. The most frequent variation found was tipus II (21.64%) and tipus III (6.49%). Insertion most frequently observed was an independent piriformis tendon inserted into the trochanteric fossa with 53.85% [5].

The authors Prasad A et al studied the onset time seems to be faster when performing a popliteal block below the bifurcation of the sciatic nerve because smaller distance to the core fibers of the 2 nerves and the larger nerve surface area exposed to the local anesthetic solution [8]. Similar explanations were given as the total additive transverse cross-sectional area of the 2 distal branches (peroneal and tibial nerves) approximates that of the single sciatic nerve before division and the length of each distal nerve segment exposed to local anesthetic is approximately the same as the length of the single sciatic nerve exposed before its bifurcation, the resulting total additive circumferential nerve surface exposed to the local anesthetic is in fact larger when 2 distal nerves are blocked individually by the authors Buys MJ et al [7].

#### CONCLUSION:

The present study reveals some of the possible variations of the division of sciatic nerve. The knowledge in the variation of sciatic nerve division is important to prevent any injury to the nerve during different surgeries in the gluteal region. The variant anatomy of the sciatic nerve may cause piriformis syndrome and failure of sciatic nerve block. The gluteal region pain symptoms and signs resemble with the vertebral disc pathology involving nerve root

injury. In addition, anatomical knowledge of this region can be useful for the interpretation of imaging techniques, especially when ultrasound-guided

injections are performed. Therefore, the surgeons and anesthesiologists should be aware of such variations while planning surgery and sciatic nerve block.

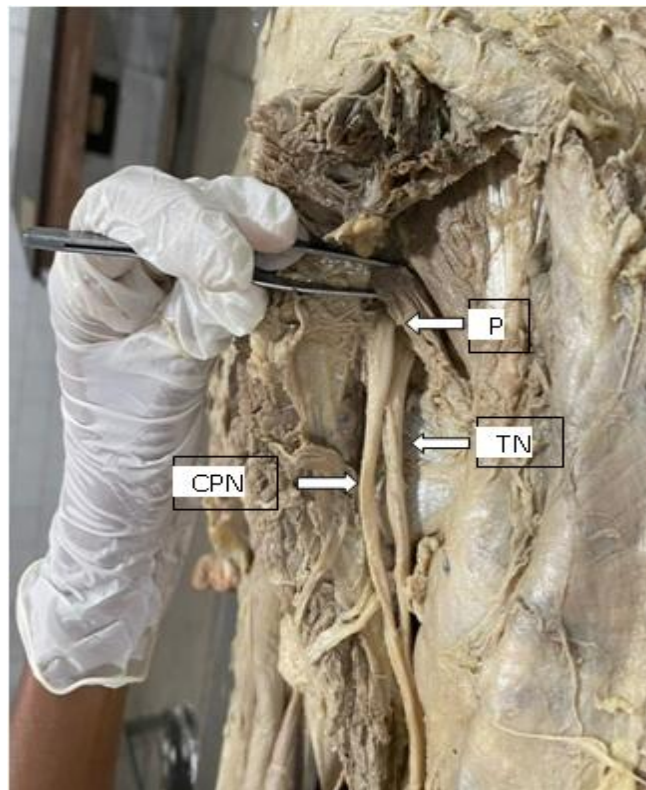
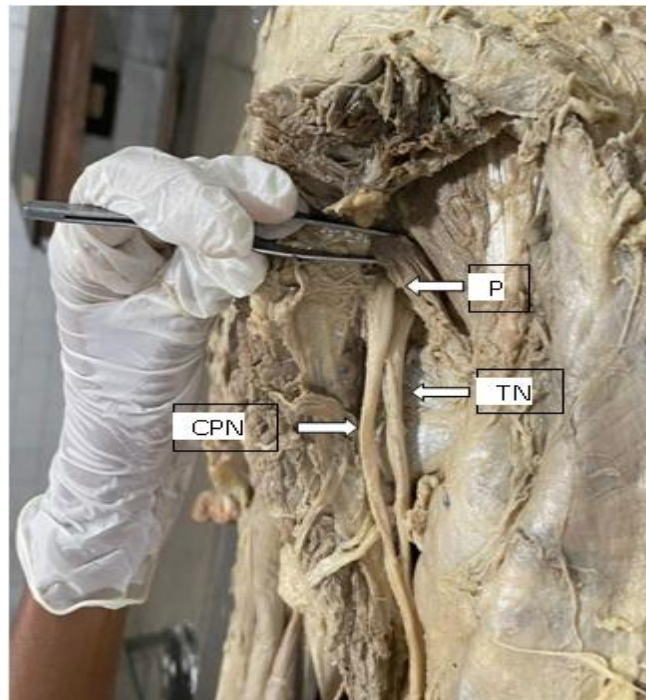


Figure 1: Common peroneal nerve emerging from two heads of the piriformis muscle.

P-Piriformis muscle, CPN-Common peroneal nerve, TN-Tibial nerve, PCN-Posterior cutaneous nerve of thigh

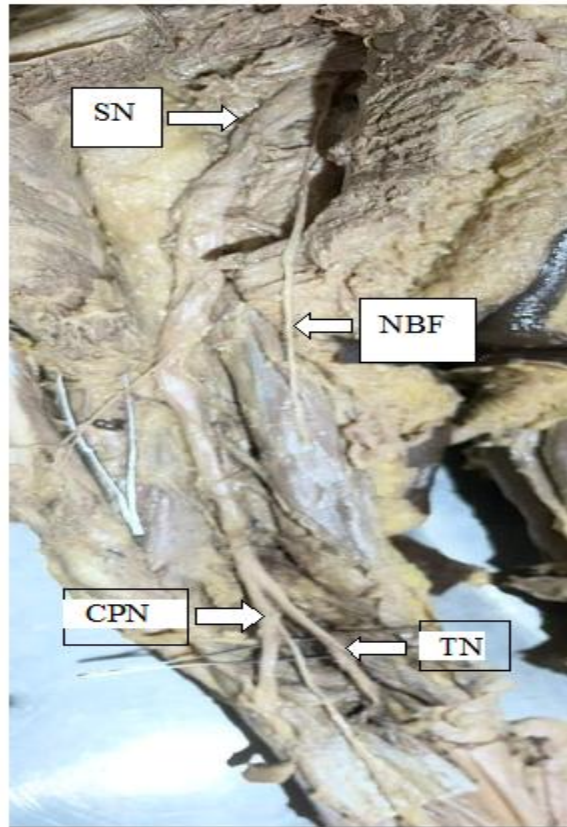


Figure2 : Trifurcation of sciatic nerve in popliteal fossa with nerve to biceps femoris emerging at higher level of piriformis muscle.SN-Sciatic nerve,NBF-Nerve to biceps femoris muscle, CPN-Common peroneal nerve,TN-Tibial nerve.

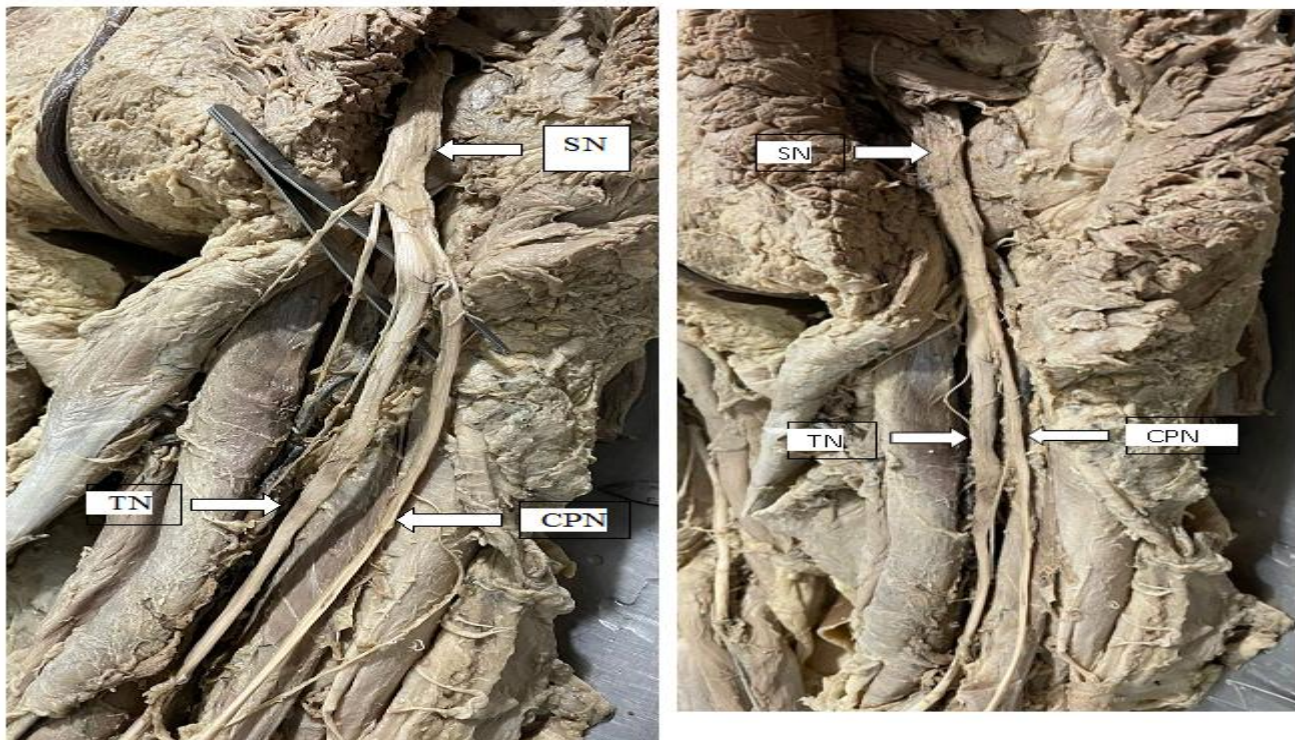


Figure3: Bifurcation of sciatic nerve into tibial and common peroneal nerve at higher level near the gluteal region.SN-Sciatic nerve, CPN-Common peroneal nerve,TN-Tibial nerve



Figure4: Bifurcation of the sciatic nerve at lower level inside popliteal fossa.

SN-Sciatic nerve with its branches to the hamstring muscle, CPN-Common peroneal nerve, TN-Tibial nerve.

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