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Variation in the Formation of Sciatic Nerve and Its Cutaneous Branches: Case Report

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ABSTRACT

We came across a cadaver with bilateral high division of sciatic nerve. With Common peroneal nerve piercing through piriformis muscle, while tibial nerve passed below the piriformis. Apart from that medial sural cutaneous nerve was seen to arise as a very thin branch from tibial division and joining relatively thick lateral sural cutaneous nerve at the junction of upper $2/3^{\text{rd}}$ and lower $1/3^{\text{rd}}$ of leg, in the same cadaver bilaterally. High division of sciatic nerve both unilateral and bilateral with division of piriformis are frequently reported variations but subsequent variation in dimensions and union of cutaneous branches from its divisions, bilaterally in the same cadaver is important, considering the surgical importance of both the nerves.

Keywords: sciatic, sural, sural communicating, piriformis syndrome, sural nerve grafting, lower union of sural nerve.

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INTRODUCTION

The sciatic nerve is the thickest nerve of the body and also largest branch of the lumbosacral plexus derived as two separate components, tibial division from ventral division of L4-5, S1-3 and common peroneal nerve from dorsal division of L4-5, S1-2. It leaves the pelvis through the greater sciatic foramen beneath the piriformis muscle. It descends on the back of ischium separated by nerve to quadrates femoris and the tendon of obturator internus with two gemilli. At the back of the thigh, the nerve passes undercover of the long head of biceps femoris and lies posterior to the adductor magnus muscle. It divided into its two components at variable distances, though frequently at the upper angle of popliteal fossa. Both the components give genicular, muscular, vascular and cutaneous branches. [1,2]

Medial sural cutaneous nerve is the largest cutaneous branch from tibial division of sciatic nerve which descends between two heads of gastrocnemius lateral to small saphenous vein [1,3,4] and receives sural communicating branch also called as lateral sural cutaneous nerve from common peroneal nerve frequently at the junction of upper 1/3rd and lower 2/3rd of leg. [2, 5-6]

Case report

During routine dissection of gluteal region the gluteus maximus was reflected to visualise structures underneath. It was reported that the piriformis muscle was pierced by emergence of common peroneal nerve through it bilaterally. Tibial nerve emerged from the lower border of piriformis with rest of the structures on both the sides. No variations were noted in rest of the genicular or muscular branches of tibial or common peroneal divisions of the sciatic nerves on both the sides.

Medial sural cutaneous nerves were given from tibial division of sciatic nerve as a very thin branch of 2 mm and 3 mm thickness and 25.9 cm and 25.7 cm length on right and left sides respectively. They followed their usual course between two heads of gastrocnemius and with small saphenous vein on medial aspect on both the sides. Lateral sural cutaneous nerves on the other hand arise from the common peroneal nerve as relatively thick branches of about 4 mm in thickness on both the sides while their lengths were 27.9 cm and 27.6 cm on right and left sides respectively. The lateral cutaneous nerve of calf was seen supplying the skin of the anterolateral and posterior surfaces of leg as usual. It was also reported that medial and lateral sural cutaneous nerves joined 22.8 cm distal to the knee joint line and 11 cm proximal to the ankle on right side while 22.4 cm distal to the knee joint line and 12 cm proximal to the ankle joint on the left side, that is at the junction of upper 2/3rd and lower 1/3rd of the leg on both the sides.

Fig: 1 shows left side common peroneal (c) and tibial division (b) of sciatic nerve. Common peroneal nerve is seen piercing Piriformis muscle (a).

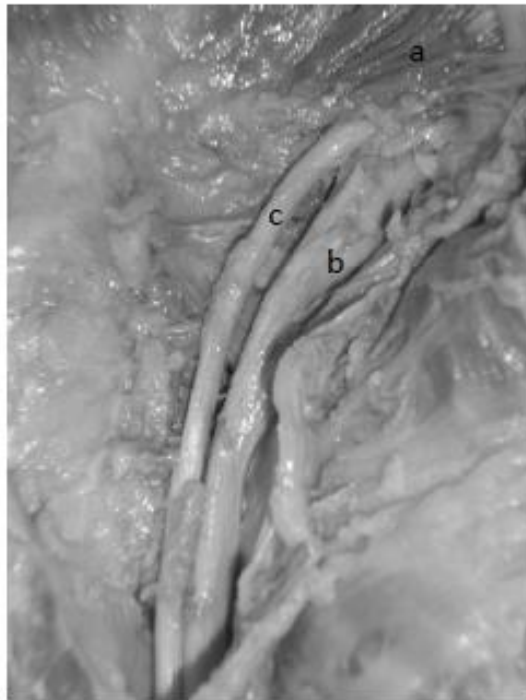


Fig: 2 shows left side common peroneal (c) and tibial division (b) of sciatic nerve. Common peroneal nerve is seen piercing Piriformis muscle (a).

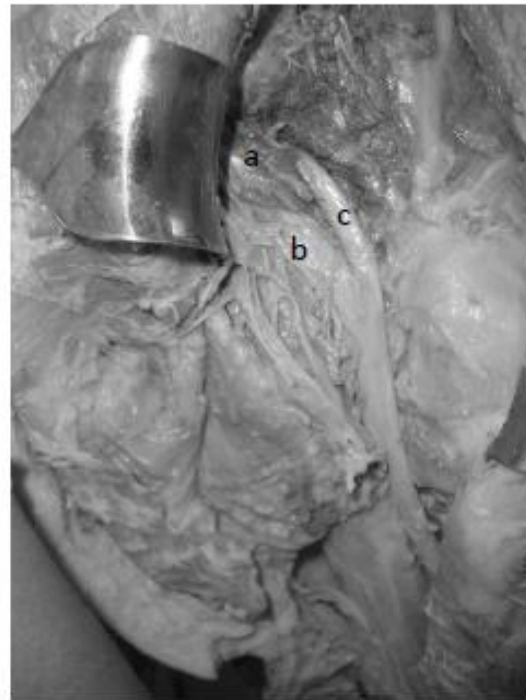


Fig 3. shows posterior aspect of leg. Medial sural cutaneous nerve (mscn) from tibial division joining thick Lateral sural cutaneous nerve (lscn) at the junction of upper 2/3rd and lower 1/3rd of leg to form sural nerve (sn). Small saphenous vein (sap v) seen on medial aspect of medial sural cutaneous nerve.

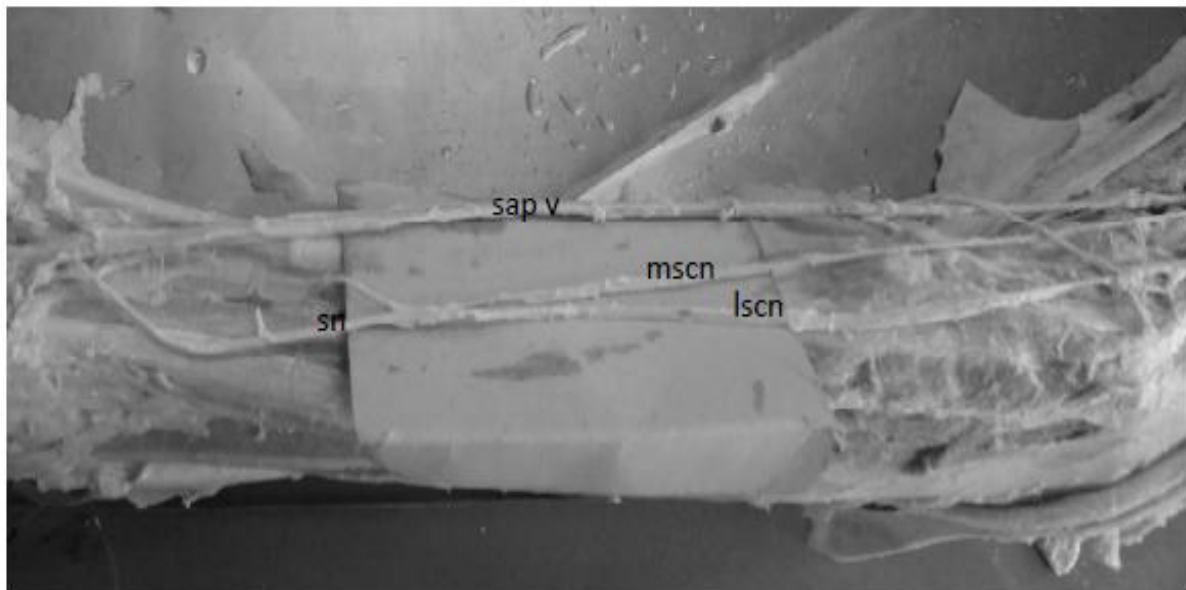
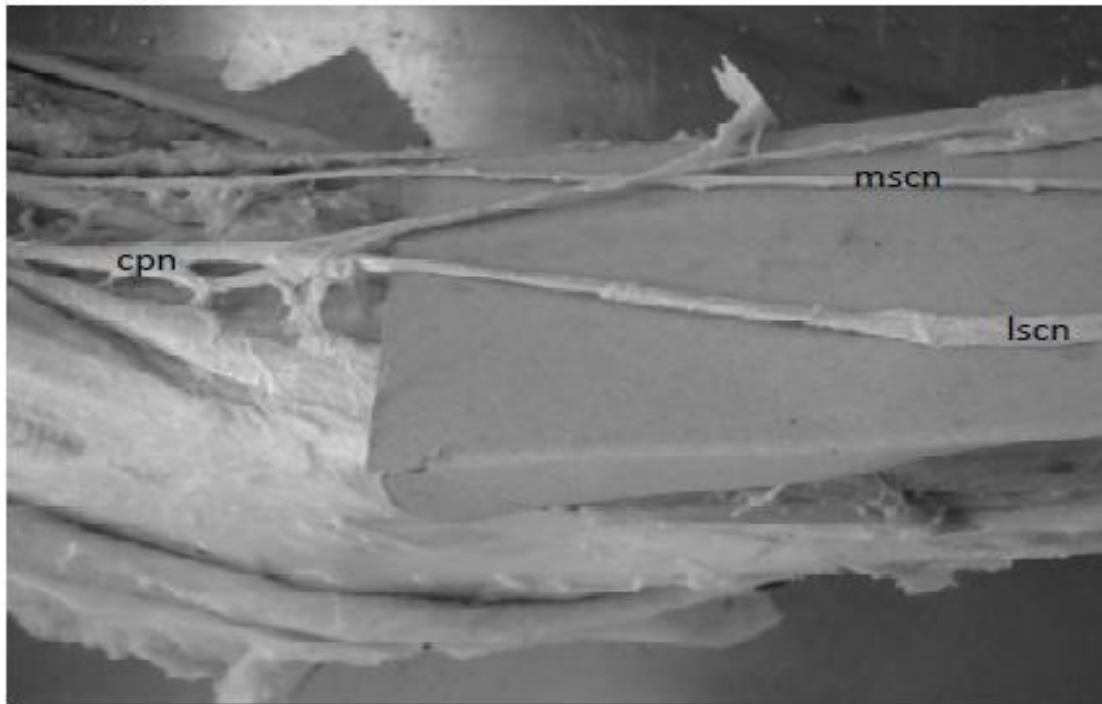


Fig 4. Closer view of thick Lateral sural cutaneous nerve (lscn) emerging from common peroneal nerve (cpn). With Medial sural cutaneous nerve (mscn) on its medial aspect.



DISCUSSION

High division of sciatic nerve with common peroneal nerve piercing piriformis muscle like in our case is considered as an important cause of piriformis syndrome due to compression of common peroneal nerve during lateral rotation of hip joint while climbing stairs and walking [7-11]. High division of sciatic nerve is also responsible for causing sciatica [7-11], failure of sciatic nerve blocks, injury following deep intramuscular injections in gluteus maximus [12] and also injuries during hip surgeries [10]. High division of sciatic nerve both unilateral as well as bilateral are widely noted variations. Many authors have attempted to classify high division of sciatic nerve. According to the classification coined by Beaton and Anson's [13] as cited by Guvencer et al [14], our case falls in Type 2 variation bilaterally, in which common peroneal nerve piercing through piriformis muscle. According to the different types of relation between piriformis and sciatic nerve mentioned by Beaton, L.E. and B.J. Anson in their study our case showed Type B variation bilaterally [13,15].

We also noted that the medial sural cutaneous nerve was given from tibial division as a very thin branch of 2 mm and 3 mm on right and left sides respectively and it joined lateral sural cutaneous nerve from common peroneal nerve which were 4 mm in thickness on both the sides, at the junction of upper 2/3rd and lower 1/3rd of leg, which is at the junction of upper 1/3rd and lower 2/3rd of leg frequently. Pasuk Mahakkanukrauh and Ranida Chomsung discussed different sites of union of medial and lateral sural cutaneous nerves in a study

conducted on 79 cadavers and mentioned that in 5.9% of cases there union was in the popliteal fossa, which in 1.9% of cases was in the middle third of the leg, in 66.7% cases in the lower third of the leg, whereas in 25.5% cases it was found to be at or just below the ankle [16]. They also mentioned variation in diameter of sural nerve from 3.5 to 3.8 mm [mean = 3.61 mm] which in our case was 3 mm and 4 mm on right and left sides respectively. According to their study the sural nerve was located 1–1.5 cm posterior from the posterior border of the lateral malleolus which was noted to be 1.8 cm and 1.9 cm on left and right sides respectively in our case, which was a significant variation considering its surgical importance. Total length of medial sural cutaneous nerve was 25.9 cm and 25.7 cm on right and left sides respectively in our report, which was 17 to 31 cm in length [mean = 20.42 cm] in their study. Similarly diameter of the same nerve was 2 mm on both right and left sides while they mentioned diameter between 2.3–2.5 mm [mean = 2.41 mm]. Lateral sural cutaneous nerve in our cadaver was found to be 25.9 cm and 25.7 cm in length on right and left sides respectively which was reported to be 15 to 32 cm (mean = 22.48 cm) by Pasuk Mahakkanukrauh and Ranida Chomsung, also the diameter of Lateral sural cutaneous nerve was found to be 4 mm in our case bilaterally which they mentioned 2.7 to 3.4 mm [mean = 3.22 mm] suggest significant difference in diameter [16]. Variation in high division of sciatic nerve both unilateral [17] as well as bilateral are frequently noted, variation in both union and thickness of medial and lateral sural nerves both unilaterally as well as bilaterally is also common but variation in dimensions along with bilateral distal union of sural nerve with bilateral high division of sciatic nerve together in the same cadaver is still a rarely reported occurrence. Considering the clinical importance of high division of sciatic nerve in piriformis syndrome, failure of sciatic nerve blocks, hip surgeries and importance of sural nerve in nerve grafting, nerve conduction studies and in sensate free grafts such combination of variations in sciatic nerve and its cutaneous branches is worth recording.

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