



Variant formation of sural nerve and its distribution at the dorsum of the foot

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ABSTRACT

Sural nerve is a sensory nerve, which supplies the skin of the posterolateral aspect of the distal third of leg, lateral malleolus, along the lateral side of foot and little toe. The sural nerve's anatomy is broadly studied in man, because it is one of the most frequently used sensory nerves in transplantation. Here is an unusual type of formation of sural nerve, from common peroneal nerve is reported. Being variant in its origin, terminal branches of the sural nerve also supplied the adjacent sides of 5th and 4th toe instead of superficial peroneal nerve. Understanding the variations of sural nerve in its formation, course and distribution may have an important role in the clinical and surgical procedures. © *IJAV*. 2009; 1: 33–34.

Key words [sural nerve] [anatomical variations] [sural nerve biopsy] [peripheral neuropathy] [sural nerve pathology]

Introduction

Sural nerve (SN) is a sensory nerve supplying the skin of the posterolateral aspect of sural region, lateral malleolus and lateral side of the foot up to little toe. Though the SN is considered as a sensory nerve, motor fibers and unmyelinated autonomic fibers have been found in 4.5% of SN [1].

The SN has important diagnostic values in tissue biopsy, nerve grafting, and neurophysiologic evaluation for the differential diagnosis of peripheral neuropathies [2,3].

Normally the SN is formed in the calf by the union of medial sural cutaneous nerve (MSCN) of tibial nerve and the peroneal communicating nerve (PCN) of common peroneal nerve. The main contribution to SN formation is still unresolved. However, Chang Hwan et al. studied the relative contributions of MSCN and PCN, and reported that the major contribution to SN formation is from MSCN [4]. Occasionally, lateral sural cutaneous nerve (LSCN) joins the MSCN to form the SN, and/or PCN may be absent [5].

Case Report

During routine dissection in the department of Anatomy, Narayana Medical College, a variation was noted in the formation of sural nerve in the right lower limb of a 61-year-old male cadaver. In the popliteal fossa, before winding around the neck of fibula, the common peroneal nerve gave a common nerve trunk, which in turn divided into sural and lateral sural cutaneous nerves. There was

neither peroneal communicating branch nor contribution from the tibial nerve; i.e., medial sural cutaneous nerve did not involve in the formation of sural nerve (Figure 1). The lateral sural cutaneous nerve divided into numerous smaller branches that pierced the deep fascia and supplied the skin at posterolateral aspect of the leg.

The sural nerve coursed between the two heads of the gastrocnemius, pierced the deep fascia in the junction between upper 2/3 and lower 1/3 of the posterior leg and it run vertically downwards lateral to small saphenous vein. Between the lateral malleolus and calcaneus, it divided into lateral dorsal sural cutaneous and intermediate dorsal cutaneous nerves supplying the skin along the lateral border of foot up to little toe and adjacent sides of 4th and 5th toe respectively (Figure 2). Prior to its two terminal branches, above the lateral malleolus, it also gave a small branch to the skin of the lateral part of the heel. At the dorsum of the leg, terminal branches communicated with the branches of superficial peroneal nerve.

Discussion

According the classical textbooks of anatomy, in the midline of popliteal fossa, the medial sural cutaneous nerve emerges from the tibial nerve, runs between the two heads of the gastrocnemius and pierces the posterior deep fascia of the leg at variable distance. The peroneal communicating nerve arises from the common peroneal nerve near the head of fibula, crosses the lateral head from lateral to medial to join the medial sural cutaneous nerve, finally join the formation of the sural nerve.

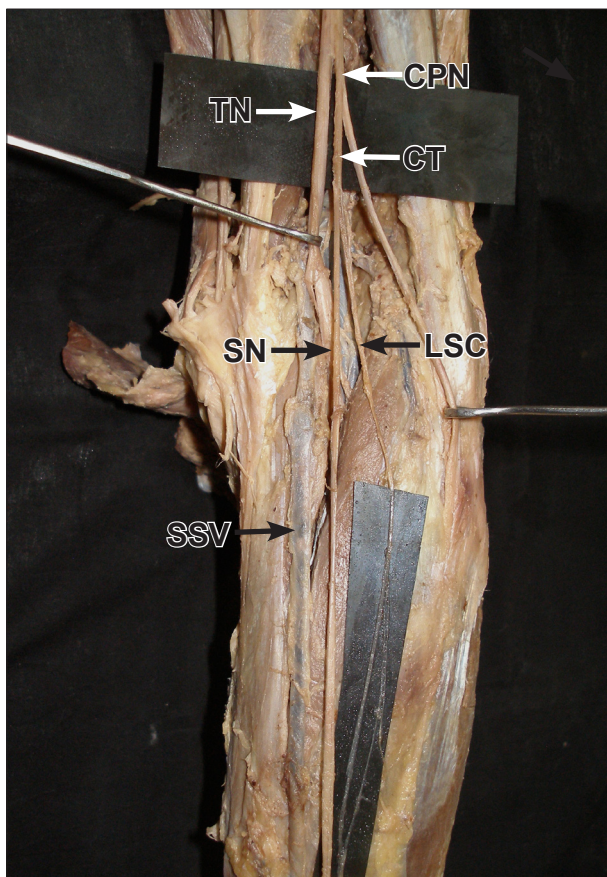


Figure 1. Dissection of the popliteal fossa and back of leg showing the variation of sural nerve and its course. (TN: tibial nerve; CPN: common peroneal nerve; CT: common nerve trunk; SN: sural nerve; LSC: lateral sural cutaneous nerve; SSV: small saphenous vein)

Occasionally, the sural nerve is not formed by the union of normal terminal branches of sciatic nerve. Instead, the medial sural cutaneous nerve from tibial nerve or peroneal communicating nerve from common peroneal nerve may continue as sural nerve which supplies the lateral surface of the leg, gives off the lateral branches to the heel and the lateral dorsal cutaneous nerve [6]. But in our case report, before the common peroneal nerve winds around the neck of the fibula, the sural nerve and lateral sural cutaneous nerve arose as a common trunk and there was no medial sural cutaneous and peroneal communicating nerve.

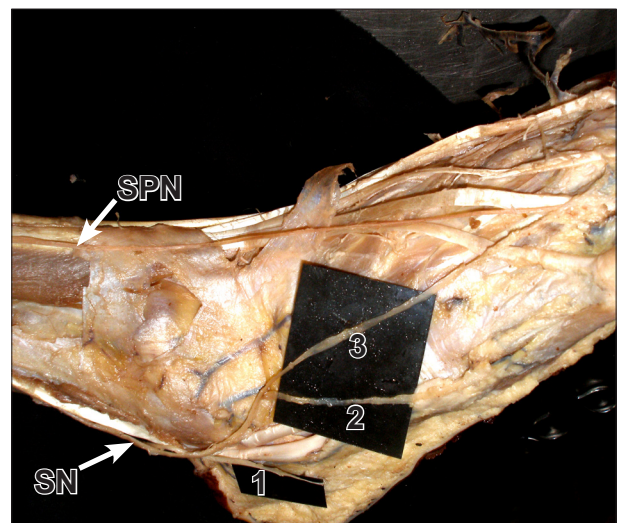


Figure 2. Closer view of course of the sural nerve in the dorsum of foot and its branches. (SN: sural nerve; SPN: superficial peroneal nerve; 1: lateral branch to heel; 2: lateral dorsal sural cutaneous nerve; 3: intermediate dorsal cutaneous nerve)

A very interesting point to be noted in our case is that the sural nerve not only arose along with lateral sural cutaneous nerve from common trunk of common peroneal nerve, but it also innervated the dorsal skin of 5th and 4th toe, similar to Hollinshead's report [7]. Such origin and distribution of sural nerve may lead to misinterpretation of common or superficial peroneal nerves in sural nerve lesions, which in turn could be affected in certain cases and give rise to other complications [8].

Clinically, the sural nerve is used in sensory nerve grafting for therapeutic purposes because of its long course; it is also used in nerve conduction velocity studies for diagnostic purposes [4]. Forfeiting the sural nerve grafts may cause chronic pain and paresthesia; in certain cases like in our study, some superficial peroneal nerve territories could also be affected because being supplied by the sural nerve [9]. In these circumstances, the lateral sural cutaneous nerve is the best choice for nerve grafting to minimize the clinical problems [10]. Our case study reporting the abnormal origin and distribution of the sural nerve, may be noteworthy and the knowledge of such variation can be of clinical interest in exploration of peripheral nerves of the calf during nerve grafts and other surgical procedures to the calf and the foot.

References

- [1] Amoiridis G, Schols L, Ameridis N, Przuntek H. Motor fibers in the sural nerve of humans. *Neurology*. 1997; 49: 1725–1728.
- [2] Williams DD. A study of the human fibular communicating nerve. *Anat Rec*. 1954; 120: 533–543.
- [3] Strauch B, Goldberg N, Herman CK. Sural nerve harvest: anatomy and technique. *J Reconstr Microsurg*. 2005; 21: 133–138.
- [4] Kim CH, Jung HY, Kim MD, Lee CJ. The relative contributions of the medial sural and peroneal communicating nerves to the sural nerve. *Yonsei Med J*. 2008; 47: 415–422.
- [5] Aktan Ikiz ZA, Ucerler H, Bilge O. The anatomic features of the sural nerve with an emphasis on its clinical importance. *Foot Ankle Int*. 2005; 26: 580–587.
- [6] Huelke DF. The origin of the peroneal communicating nerve in adult man. *Anat Rec*. 1958; 132:81–92.
- [7] Hollinshead WH. *Anatomy for surgeons: The back and limbs, Volume 3*. New York, Paul Hoeber Inc. 1958; 788.
- [8] Haymaker W, Woodhall B. *Peripheral Nerve Injuries, Principles of Diagnosis*. Philadelphia & London: WE Saunders. 1953; 287–301.
- [9] Ruth A, Schulmeyer FJ, Roesch M, Woertgen C, Brawanski A. Diagnostic and therapeutic value due to suspected diagnosis, long-term complications, and indication for sural nerve biopsy. *Clin Neurol Neurosurg*. 2005; 107: 214–217.
- [10] Ortiguera ME, Wood MB, Cahill DR. Anatomy of the sural nerve complex. *J Hand Surg [Am]*. 1987; 12: 1119–1123.