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Original Article

Anatomical variations of the formation of human sural nerve in stillborns

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ABSTRACT

Introduction: The sural nerve (SN) is formed by the union of the medial and lateral sural cutaneous nerves (MSCN, LSCN) of the leg that originate from the tibial and common peroneal nerves. Sural nerve is used for various reasons in surgical operations. The sural nerve is universally recognized by surgeons as a site for harvesting an autologous nerve graft The aim of this study was to describe the course, variations, morphometric analysis and some clinically significant relations of the human sural nerve in stillborns.
Methods: The study was carried out on 18 Turkish stillborns, 12 males and 6 females. The formation of sural nevre was classified into three main groups. The site of formation of the sural nerve was observed and the length of the sural nerve components were measured.
Results: Three types of SN formation were observed. Type A (anastomotic type) was seen in 33 of the observed 36 legs (92%). The site of formation of the SN by union of the MSCN and LSCN was 30% (10/33). In males, the mean length of MSCN was 24.59 ± 14.84 mm and 27.45 ± 23.30 mm in females.
Discussion: This study was performed to ensure an anatomical and morphometrical description of the sural nerve and its components in 18 embalmed stillborns. Due to its great importance in neurosurgery and plastic surgery, the formation type, course and formation level of the sural nerve have been studied on different races and age groups since the beginning of the last century.

1. Introduction

The sural nerve (SN) is a sensory nerve supplying the skin of the lateral and posterior part of the inferior third of the leg and lateral side of the foot.[1] Generally it is formed by the union of the medial sural cutaneous nerve(MSCN), a branch of the tibial nerve(TN), and the lateral sural cutaneous nerve(LSCN), a branch of common peroneal nerve(CPN).[2] Since the SN is used as a graft for many peripheral nerve lesions, anatomic study of this nerve in cadavers is important to reveal such information as the formation type and site of the nerve and its relationship to surrounding structures.[3]

The nomeclature applied to the LSCN contribution is confusing.[2] Some authors term this branch the peroneal communicating branch(PCB) of CPN[4] or communicating ramus of LSCN.[5,6,7] Coert and Dellon[8] and Mahakkarauh and Chomsung[2] term this branch LSCN. In the present study we followed them and called it LSCN. The components of sural nerve(MSCN, LSCN) communicate at a variable level of leg. This union may occur in the upper third of the leg, middle third of the leg or the lower third of the leg.[7] Some authors classified the union site into four groups; upper, second, third and fourth quarter of the leg.[5,6,9]

Sural nerve is used for various reasons in surgical operations. Foremost among these reasons are peripheral nerve surgery. Because SN is a pure sensory nerve, provides enough grafting and causes no problems in its absence; it is the most frequently chosen graft source in peripheral nerve injuries.[10] Also, sural nerve biopsy is usually preferred for common peripheral nerve diseases.[11,12]

Sural nerve transmits sensory signals from the lateral dorsum of the foot and 5th toe to the brain.[12,13] Tissue loss might be seen in this region due to local traumas and diabetes mellitus. Especially, additional complications may occur after surgical interventions due to systemic problems in patients with diabetes mellitus. Regional anesthesia is preferred in these cases because general anesthesia might increase this risk. Thus, sural nerve block during surgical interventions in the location of SN is a proper preference that will increase patient comfort and lower the possibility of systemic complications and can be easily performed by the surgeon. Sural nerve block can be achieved by the injection of

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Table 1
Distribution of symmetry and asymmetry in Sural Nerve.

Symmetry / Asymmetry in Sural Nerve	% (n)
Symmetry	**83% (15/18)**
Asymmetry	**17% (3/18)**
Total	**100% (18/18)**

Table 2
Formation Type of SN. SN: Sural Nerve.

Formation Type of Sural Nerve	% (n)
Type A SN (Anastomotic Type)	**92% (33/36)**
Type B SN (Tibial Non-anastomotic Type)	**8% (3/36)**
Type C SN (Peroneal Non-anastomotic Type)	**0%(0/36)**
Total	**100% (36/36)**

Table 3
Forming Location of Sural Nerve.

Forming Location of Sural Nerve	% (n)
1st Ouarter of Leg (Popliteal Fossa)	**0% (0/36)**
2nd Ouarter of Leg	**30% (10/33)**
3rd Ouarter of Leg	**70% (23/36)**
4th Ouarter of Leg	**0% (0/36)**
Total	**100% (36/36)**

5–7 ml %2 lidocaine solution infiltration in the area between Achilles tendon and lateral malleolus.[14] Cutaneous nerve blocks of the lower extremity are useful anesthetic techniques that can be used as a sole anesthetic technique for minor surgical procedures. More commonly, these blocks are used as an adjunct to the major conduction blocks of the lower extremity. These blocks are superficial, require minimal equipment, are relatively simple to accomplish and learn, and should be in the armamentarium of every practitioner.[15]

Surgeons and anesthetists should have the knowledge of sural nerve anatomy because of the reasons mentioned above.The aim of this study was to describe the course, variations, morphometric analysis and some clinically significant relations of the human sural nerve in stillborns.

2. Material and methods

The study was carried out on 18 Turkish stillborns, 12 males and 6 females. They were preserved in %5 formalin. Each specimen was dissected by removal of the skin and the fascia of the back of the thigh, popliteal fossa, leg and dorsum of the foot.

The formation of SN was classified into three main groups. The pattern of formation of the SN has been broadly divided into three types A, B and C by Huelke.[6] Type A is called the anostomotic type and receives a contribution from the TN, termed the MSCN and a contribution from the CPN called the LSCN. Type B and C are non-

Table 4
The Length of Sural Nerve Components. MSCN: Medial Sural Cutaneous Nerve, LSCN: Lateral Sural Cutaneous Nerve.

Branch of Sural Nerve	Male	Female	p
MSCN	**24.59 ± 14.84 mm**	**27.45 ± 23.30 mm**	**(p = 0.880, p > 0.05)**
LSCN	**27.04 ± 16.33 mm**	**28.82 ± 24.46 mm**	**(P = 0.614, p > 0.05)**

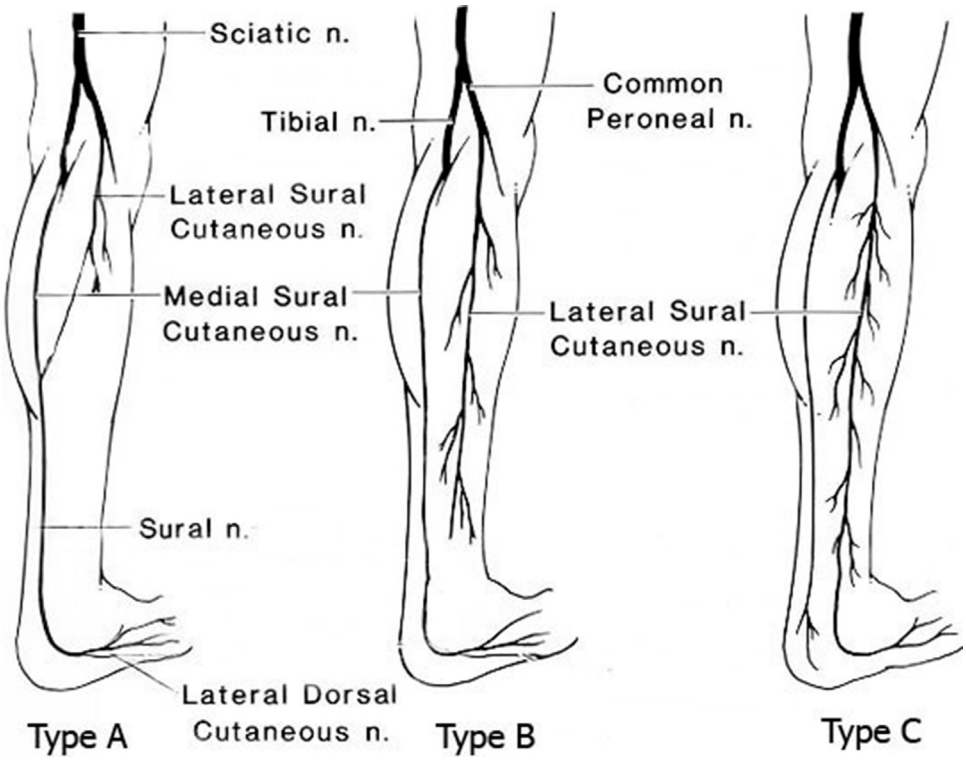

Fig. 1. The types of the formation of the sural nerve (SN). Type A: Anastomotic type, Type B: Tibial non-anastomotic type, Type C: peroneal non-anastomotic type. (Modified from Huelke[6]).