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# A rare case of bifurcated lesser occipital nerve in the posterior triangle of the neck

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## ABSTRACT

The origin of the lesser occipital nerve (LON) may vary, but variations in its pattern are rare. We report here a case of LON, bifurcated into superior and inferior roots in the posterior triangle of the neck. Bifurcation of the LON formed about 1.5 cm above the nerve point of the neck, near the posterior border of the sternocleidomastoid muscle. Both roots ascended obliquely upwards, and later united to form a single trunk in the upper part of the posterior triangle of the neck. It then entered the scalp where its distribution was normal. Since the cutaneous nerves of the cervical plexus are anesthetized for pain relief, as with cervicogenic headache, exceptional morphological variations of these nerves should be taken into consideration before any anesthetic procedures are performed in this region.

Key words: Bifurcation, cervical plexus, lesser occipital nerve, neck, posterior triangle

# Introduction

Four cervical cutaneous nerves from the cervical plexus arise at the posterior border of the sternocleidomastoid muscle (SCM) in the posterior triangle of the neck. The site of common emergence of these nerves in the neck is referred to as the nerve point of the neck [1]. The lesser occipital nerve (LON) is one of these nerves, and conveys fibers of the second cervical nerve [2]. The LON is in the posterior triangle of the neck as a single nerve found alongside other cervical cutaneous nerves. In the posterior triangle, it usually hooks around the spinal part of the accessory nerve (AN), and then ascends upwards along the posterior border of the SCM. It reaches the scalp behind the auricle and provides cutaneous innervation up to the superior nuchal line and a small area on the cranial surface of the auricle [3].

Morphological variations in the origin of the LON [4] and its duplication or triplication have been reported [5-7]. The triplication of LON is the most rare, and has been categorized as an additional classification type of LON [6]. A case of anomalous LON coursing into the occipital area was reported by Lucas et al. [7]. However, there is no report in the literature of bifurcated LON with eventual re-union. Here, we report such a case of LON and its possible clinical implications. The

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**Figure 1.** Dissection of the side of the neck shows ascension of the bifurcated lesser occipital nerve (LON) into the superior root (SR) and inferior root (IR) with their eventual union forming the trunk of the LON. SCM - Sternocleidomastoid muscle, SC - Splenius capitis, TM - Trapezius muscle (reflected downwards), PEJV - Posterior external jugular vein, AN - Accessory nerve, SCN - Supraclavicular nerves, GAN - Great auricular nerve.

morphological variation of the LON is clinically significant because its compression or stretching often leads to cervicogenic headache [3] or occipital neuralgia [8].

#### **Case Report**

During routine dissection of the posterior triangle of the neck for undergraduate medical students, we observed bifurcated LON on the right side of the neck of an adult male cadaver aged about 60 years. The LON originating from the cervical plexus was bifurcated at about 1.5 cm cranial to the nerve point of the neck into the superior and inferior roots (IRs) (Figures 1 and 2). Its IR hooked around the AN and ascended upwards along the posterior border of the SCM, and its superior root joined the IR about 5 cm above the nerve point. Further upwards, the united nerve trunk was accompanied by the posterior external jugular vein superficial to the splenius capitis muscle. It then entered the scalp where it was normally distributed.

# Discussion

Cutaneous nerves of the cervical plexus carry sen-

sation from the skin of the neck. Generally, these nerves are sedated by local anesthetics used for pain relief, or during minor surgery in the cervical region at the nerve point of the neck. To achieve effective anesthetization of these nerves, it is important to have prior knowledge of their possible variations in origin, course, and pattern. This is because anesthetizing these nerves may produce an unexpected loss of sensation over the operative field [8], as occasionally the emerging point of these nerves does not correspond with where the nerve point of the neck lies, as in the case of polymorphic patterns or variation in their numbers.

LON, a derivative of the cervical plexus, lies in the superficial fascia over the posterior triangle. Normally it conveys fibers of the C2 nerve, although occasionally fibers of C3 may contribute to its formation [3]. A study by Sanjai et al. on the prevalence of its variant origin, identified four possible origins. According to this report, in about 75% of cases, the LON may be formed by the union of C2 and C3 nerves, and in 4.6% of cases, it may arise from C3 and C4 nerves. The other



Figure 2. Closer view of the emergence of the cervical cutaneous nerves at the nerve point of the neck (asterisk) with bifurcation and reunion of the lesser occipital nerve. IR - Inferior root hooking accessory nerve (AN), SR - Superior root, TCCN - Transverse cervical cutaneous nerve, GAN - Great auricular nerve, SCM - Sternocleidomastoid, SC - Splenius capitis.

two groups were formed by individual contribution from either C2 (11.11%) or C3 (9.26%) [4]. A similar study on fetuses revealed the presence of duplicated and triplicated LON [1,9], and LON piercing the spinal AN [1]. Seventy percent of cases have a single LON; however, 26% and 4% of cases have duplication and triplication of the LON, respectively [9]. It has also been reported that 6% of cases have a variant course of LON [9].

In the present case, we observed bifurcated LON in the neck, which is the rarest variation of LON, and its eventual union to form a single nerve. Knowledge of such morphological variations of the LON may assist in the understanding of cervicogenic headaches, and may also be helpful to anesthesiologists performing regional anesthesia for surgical procedures in the neck. Blocking the C2-C4 cervical nerve is commonly employed as a regional anesthetic procedure for patients undergoing open carotid surgery, as in the case of carotid endarterectomy [10]. Possible variations like bifurcation of the LON should be taking into consideration while anesthetizing the cervical plexus at the nerve point of the neck.

### **Conflict of interest statement**

The authors have no conflicts of interest to declare. **References** 

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