

Unilateral linguofacial trunk

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Abstract

The external carotid artery is the main artery of the head and neck region. It has eight branches, and there are various variations in the emergence and distribution of these branches. In particular, frequent changes can be observed in the emergence of facial artery, and lingual artery. Knowledge of the vascular anatomy of the lingual artery and facial artery is important in terms of neck surgery and radical treatments. For this reason, in the present case report we aimed to report a case with linguofacial trunk and its morphometric and morphological features.

Keywords: external carotid artery; facial artery; lingual artery; linguofacial trunk

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Introduction

The common carotid artery (CCA) divides into external and internal carotid arteries at the upper edge of the thyroid cartilage about the level of the intervertebral disc between the 3rd and 4th vertebrae. The external carotid artery (ECA) serves as the main artery of head and neck region. The ECA also plays an important role in providing collateral blood supply to the brain through the many connections between the branches of the ECA and cranial branches of the internal carotid artery (ICA) and vertebral arteries.^[1] The ECA has eight branches: superior thyroid artery, ascending pharyngeal artery, lingual artery, facial artery, occipital artery, posterior auricular artery, superficial temporal artery, and maxillary artery.^[2]

It is known that ECA has many variations in the distribution of its anterior branches, including superior thyroid artery (STA), facial artery (FA), and lingual artery (LA).^[3] These anterior branches present to form common origins named as: thyrolinguofacial trunk, thyrolingual trunk, and linguofacial trunk.^[4] The linguofacial trunk, when present, is located above the superior thyroid artery, which appears to be the most common variation.^[5,6] In the previous studies, the presence of linguofacial trunk (LFT) has been reported in a wide range of incidence between 6% and 20%.^[6]

Knowledge of the vascular anatomy of the LA and FA has utmost importance for surgical, radiological, and

diagnostic procedures of the head and neck region. In the present manuscript, we aimed to report a case with unilateral LFT and provide more information about the origin, course, and anatomical relationships of the LFT related to the head and neck anatomy.

Case Report

Anatomical variations of the branches of the external carotid artery were encountered during routine neck dissection of a 67-year-old male cadaver obtained from Dokuz Eylül University Medical Faculty Anatomy Laboratory. The cadaver was fixed with formaldehyde from the left common carotid artery. The cadaver was placed in the supine position and measurements were made using a Mitutoyo digital vernier caliper sensitive to 0.01 mm.

The skin, superficial fascia with platysma, and deep fascia were dissected. The distance between the hyoid bone and mental protuberance was 48.51 mm, and the distance between the hyoid bone and jugular notch of sternum was 82.16 mm. Hypoglossal nerve was preserved on both sides. The sternocleidomastoid muscle was cut about its midline on the left side and preserved on the right side.

The formation of the branches of the ECA was in the common anatomical pattern on the left side (**Figure 1**). The distance between the origin of the LA and the carotid bifurcation was 10.42 mm. The vertical distance between

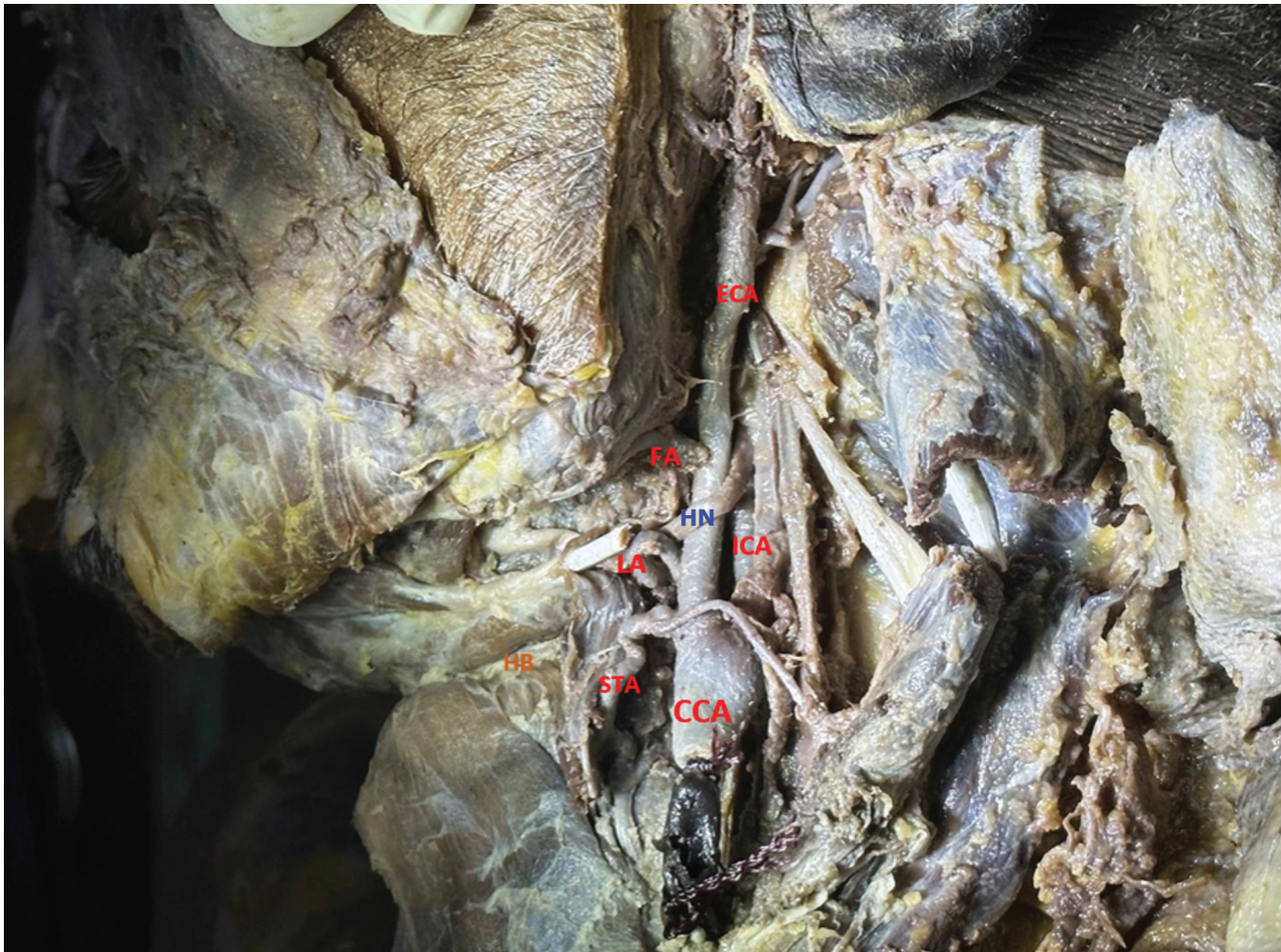


Figure 1. Facial artery and lingual artery emerging separately from the ECA, left side. CCA: common carotid artery; ECA: external carotid artery; FA: facial artery; HB: hyoid bone; HN: hypoglossal nerve; ICA: internal carotid artery; LA: lingual artery; STA: superior thyroid artery.

the origin of the LA and the horizontal plane passing over the carotid bifurcation was 5.07 mm; the vertical distance between the LA and the horizontal plane passing over the hyoid bone was 7.89 mm. The distance between the FA and the carotid bifurcation was 21.75 mm. The vertical distance between the origin of the FA and the horizontal plane passing over the carotid bifurcation was 19.93 mm; the vertical distance between the FA and the horizontal plane passing over the hyoid bone was 51 mm. On the right side (**Figure 2**), FA and LA branched from a common trunk. The length of the LFT was 9.19 mm. The distance between the origin of the LFT and carotid bifurcation was 21.44 mm, the vertical distance between the origin of the LFT and the horizontal plane passing over the carotid bifurcation was 16.23 mm. The vertical distances from the origin and bifurcation points of the LFT to the horizontal plane passing over the hyoid bone were 13.15 mm and 24.30 mm, respectively.

Discussion

The reasons behind the variations of the external carotid artery and its branches are not fully understood. Variations may be due to some deviations that occurred during the embryological process. The development of the variations begins with the combinations of the following factors: outgrowths from some vessels, involution of others, and assimilation of pre-existing channels that arise from undifferentiated precursor vessels.^[5] Although these anatomical variations might remain unnoticed, they become more crucial when there are pathological cases, for instance, loss of elasticity or development of an aneurysm in the trunk.^[7] In this case report, we aimed to represent a case with unilateral LFT.

In a recent study, Devadas et al.^[5] studied with 40 cadavers and examined the variations of the branches of ECA in the neck. In this study, the anterior branches of

Table 1

The reported incidence of LFT in previous studies.

Study	Evaluated case number	Lingo-facial trunk (%)
Zumre et al. ^[7] (2005)	20	20
Ozgur et al. ^[8] (2008)	94	7.5
Sanjeev et al. ^[10] (2010)	119	18.92
Devadas et al. ^[5] (2018)	40	21.25
Lucev et al. ^[4] (2000)	20	20
Shintani et al. ^[11] (1999)	31	31
Gupta and Agarwal ^[12] (2013)	30	11.3

the ECA were reported in their normal branching pattern on 63 sides (78.75% of the total 80 cases). In the remaining 17 sides (21.25% of the total 80 cases), the formation of common trunks was observed, and the linguofacial trunk was reported as the most common variation. The linguofacial trunk was observed on 16 sides, and the thyrolinguofacial trunk was observed on one side. In this study, the LFT was observed bilaterally in 5 cadavers (12.5% of the total 40 cadavers) and unilaterally in 6 cadavers (15% of the total 40 cadavers). Similar to Devades et al., ECA and its variations have been studied in various studies. The incidences of the presence of the LFT have been reported to vary between 7.5–31% (**Table 1**).

In the present case, the LFT length was measured as 9.19 mm. In previous studies, Özgür et al.^[8] reported this length as 11.46 mm, 6.58 mm and 4.36 mm in 3 cases; Fazan et al.^[9] reported the mean length as 9.4 mm on the right and 7.6 mm on the left in 18 cases; Troupis et al.^[6] measured the LFT length in one case and reported it as 7.3 mm. The length of the LFT varies between 4.36 mm and 11.46 mm according to the literature. In addition, the distances between the carotid bifurcation and the starting point of the LFT were reported as 7.9 and 11.6 mm by Fazan et al.^[9] and Troupis et al.^[6] respectively. In our case, the distance between the carotid bifurcation and the origin was 21.44 mm. Fazan et al.^[9] reported that the ECA bifurcation was higher in their cases. In our cadaver, the bifurcation of the common carotid artery was at the upper level of the thyroid cartilage on the right and at the level of the os hyoideum on the left. We aimed to localise the origin of the LFT and triangulation points defined as the mental process, hyoid bone and jugular notch were used to assess the length of the neck. The distance between the carotid bifurcation and the sternoclavicular joint was 81.28 mm on the right and 84.25 mm on the left.



Figure 2. Representing the variation of facial and lingual artery branching from the linguofacial trunk, right side. CCA: common carotid artery; ECA: external carotid artery; STA: superior thyroid artery; LA: lingual artery; FA: facial artery; LFT: linguofacial trunk.

In conclusion, knowledge of the variations of the ECA and its branches is important from a surgical and radiological point of view. Clinicians should be aware of these variations when performing head and surgical, maxillofacial surgery, radiological and diagnostic procedures.

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Conflict of Interest

The authors declare that they have no conflict of interest.

Author Contributions

All authors contributed equally.

Ethics Approval

The authors hereby confirm that every effort was made to comply with all local and international ethical guidelines and laws concerning the use of human cadaveric donors in anatomical research.

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