

Original Article

Unusual branching of left common carotid artery

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ABSTRACT

Usually each common carotid artery terminates by dividing two branches namely external and internal carotid arteries. Variations in the branching pattern of common carotid artery are not uncommon. We observed anomalous origin of thyrolingual trunk from left common carotid artery in three cases out of 32 adult embalmed cadavers. This anomalous arterial trunk was found to divide into an ascending tortuous lingual artery and descending superior thyroid artery. Such type of anatomical variation is of important for surgeons and radiologists to avoid complications during neck surgeries and investigative procedures.

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1. Introduction

Normally right common carotid artery arises from brachiocephalic artery behind the right sternoclavicular joint whereas left one arises from arch of aorta behind the centre of manubrium sterni. Each common carotid artery ascends posterolaterally within carotid sheath in the carotid triangle upto the upper border of thyroid cartilage where it divides into external and internal carotid arteries. The trunk does not give any other branches except the terminal branches. The external carotid artery lies anteromedially whereas internal carotid artery lies posterolaterally. The external carotid artery usually gives rise to 8 branches namely superior thyroid artery, lingual artery, ascending pharyngeal artery, facial artery, occipital artery, posterior auricular artery, maxillary artery and superficial temporal artery from below upwards in the cervicofacial region. Occasionally few branches may arise with a common trunk like thyrolingual trunk or linguofacial trunk or thyrolinguofacial trunk from external carotid artery. The frequency of occurrence of linguofacial trunk is more common than that of thyrolingual trunk or thyrolinguofacial trunk.

The superior thyroid artery, being one of the ventral branches of external carotid artery arises just below the level of tip of greater cornu of hyoid bone, runs forwards downwards and medially superficial to inferior constrictor muscle of pharynx and external laryngeal nerve. On reaching very close to apex of thyroid lobe, the superior thyroid artery divides into anterior descending branch which runs along anterior border of thyroid lobe and upper border

of isthmus to anastomose with the same branch of opposite side and posterior descending branch which runs along posterior border of thyroid lobe to anastomose with inferior thyroid artery.

The lingual artery being the another ventral branch of external carotid artery arises at the level of tip of greater cornu of hyoid bone, runs forwards, makes an upward loop and then turns downwards over the middle constrictor muscle of pharynx. From there, it disappears from carotid triangle by passing deep to posterior belly of digastric and stylohyoid muscles to enter into digastric triangle where it passes forwards deep to posterior border of hyoglossus muscle. On reaching the anterior border of hyoglossus, it ascends and runs forwards on the side of frenulum of tongue along the ventral surface of tongue submucosally to anastomose with the same artery of opposite side.

MATERIALS AND METHODS:

On routine dissection of head & neck and thoracic regions of 32 adult embalmed cadavers in the dissection hall, department of the Anatomy, Alluri Sitaramaraju Academy of Medical Sciences, Eluru during 2013-2014, an anatomical variation like thyrolingual trunk was found originating from left common carotid artery in 3 cadavers and photographed.

RESULTS:

The right common carotid artery was found originating from brachiocephalic artery whereas left one (1st Fig -1) from arch of aorta. The course of each common carotid artery was observed normal within carotid triangle. Each common carotid artery was noticed to divide into external (2nd Fig-1) and internal (3rd Fig-1) carotid arteries at the level of upper border of thyroid cartilage. The

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external carotid artery was found anteromedial to internal carotid artery. The right external carotid artery was observed giving normal 8 branches whereas left one was noticed to give rise to normal last 6 branches except superior thyroid and lingual arteries. These superior thyroid and lingual arteries were found originating as a common trunk from ventral aspect of left common carotid artery. This thyrolingual trunk (4th Fig-1) was seen originating 1.2cm (in 2 cadavers) and 1.4cm (in one cadaver) below the bifurcation of left common carotid artery. The length of this trunk was measured 1cm from its origin. At first this trunk was found running forwards and medially (first 0.6 cm from its origin) and then running upwards forwards and medially (the remaining 0.4 cm) dividing into an ascending tortuous lingual artery (5th Fig-1) and descending superior thyroid artery (6th Fig-1). The ascending tortuous lingual artery was running upwards and forwards and disappeared from carotid triangle by passing deep to intermediate tendon of posterior belly of diagastric (12th Fig-1) and stylohyoid muscles. The remaining course of lingual artery was found normal. The descending superior thyroid artery was running downwards and forwards and on reaching close to thyroid lobe divided into anterior descending branch (6th a Fig-1) running at first upwards up to the apex of thyroid lobe and then along anterior border of thyroid lobe to anastomose the same branch of opposite side and posterior descending branch (6th b Fig-1) running along posterior border of thyroid lobe to anastomose with the ascending branch (7th a Fig-1) of inferior thyroid artery (7th Fig-1). No branches were found to arise from right common carotid artery. The internal carotid arteries of both sides were found normal.

Figure.1 Thyrolingual trunk from left common carotid artery

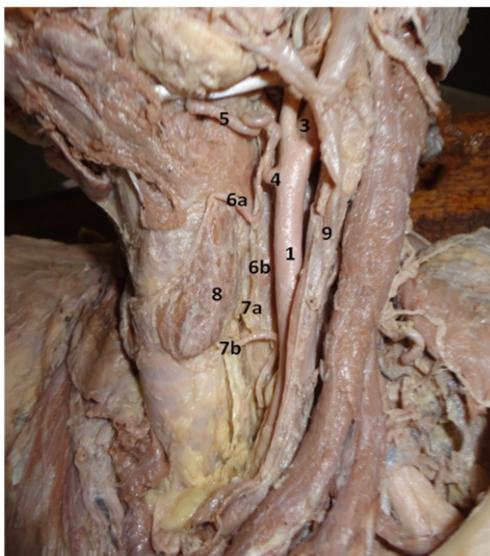
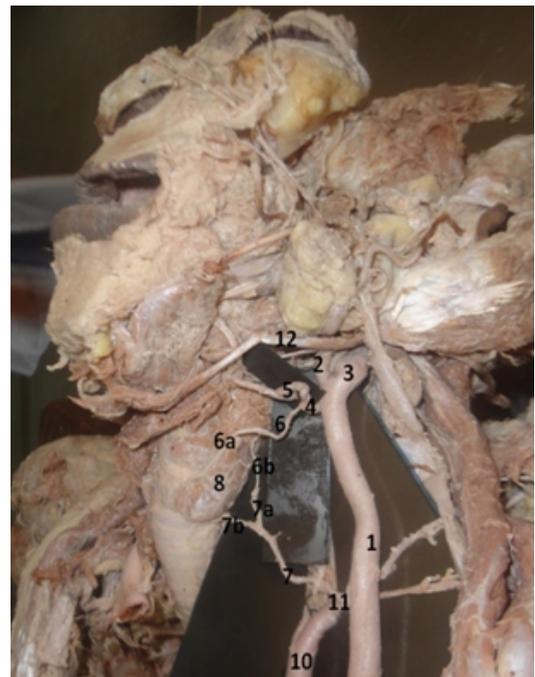


Figure.2. Thyrolingual trunk from left common carotid artery (after keeping x-ray film for better visualisation)



1. Left common carotid artery
2. External carotid artery
3. Internal carotid artery
4. Thyrolingual trunk
5. Lingual artery
6. Superior thyroid artery
- 6a. &6b. Anterior and posterior descending branches of superior thyroid artery
7. Inferior thyroid artery
- 7a.&7b. branches of inferior thyroid artery
8. Left thyroid lobe
9. Internal jugular vein
10. subclavian artery
11. Thyrocervical trunk
12. Posterior belly of diagastric

Frequency of Occurance of various branches originating from common carotid artery

Author;s Name	Superior Thyroid artery from common carotid artery	Lingual artery from common carotid artery	Thyrolingual trunk from common	Linguofacial trunk from common carotid artery
Kozielec et.al	----	----	----	43%
W. Henry Hollinshead	16%	----	----	----
Grant	----	----	----	20%
Quain	----	----	0.50%	----
Bubhiraja V et.al	----	----	3.34%	----
Lippert et.al	----	----	0.10%	----
Dr. Pulipati Anil Kumar	----	----	9.37%	----

DISCUSSION:

The carotid system of arteries which supply head, neck and brain presents a wide range of variations. There are some reports of different variations of carotid system by different authors. Williams et al found that the common carotid artery has no branches but the vertebral, superior thyroid, or its laryngeal branch, ascending pharyngeal, inferior thyroid or occipital arteries may be branches of it. The lingual artery often arises with the facial or, less often, with the superior thyroid artery.

In 110 human fetuses, a common linguofacial trunk occurred in 43%; in 42% the facial artery did not reach the medial orbital angle, ending as a superior(20%) or inferior(22%) labial artery (Kozielec & Jozwa 1977).

W. Henry Hollinshead mentioned that the superior thyroid artery may originate from common carotid artery in 16% of cases.

According to Grant, in about 20% of cases, the lingual and facial arteries were found to arise together by a common stem.

J. D. Boyd described that both external and internal carotid arteries may arise independently from the subclavian artery and there may be therefore no common carotid artery.

Kantor recorded 2cases in which the common carotid artery bifurcated immediately after its origin. Quain reported 31 cases of abnormally low bifurcation among 295 individuals. There was a report of thyrolingual trunk originated from right common carotid artery 2cm below the carotid bifurcation during dissections of head and neck regions of 200 cadavers(Babu B.P.,2001).

There was a report of variant origin of thyrolingual trunk from left common carotid artery 2cm below the bifurcation in one case out of 30 adult cadavers dissected (Budhiraja V, Rastogi R, 2007-2008).

The origin of thyrolingual trunk from external carotid artery was reported with the incidence of 0.7-3% (Adachi, 1928; Quain, 1944;Lippert and Pabst, 1985) but its origin from common carotid artery was reported with the incidence of less than 0.1% (Lippert and Pabst, 1985)

According to Nelson ML, Sparks CD, the aortic arch and its branches were removed en bloc at autopsy from men of Japanese ancestry born in Hawaii. Of the 193 arterial trees examined, 182 (94.3%) had a typical branching pattern (e.g., brachiocephalic trunk, left common carotid, and left subclavian arteries, in that order). Two specimens had only two branches arising from the aortic arch, a common trunk uniting the brachiocephalic and left common carotid arteries and a left subclavian artery. Nine individuals (4.6%) had four branches off the aortic arch; in eight of these cases (4.1%), the left vertebral artery originated directly off the aortic arch just proximal to, or as a common trunk with, the left subclavian artery. A unique aortic arch branching pattern was found in one of these men. The four arteries arising from the arch of the aorta were, in sequence: right subclavian, left subclavian, right common carotid, and left common carotid. The literature on aortic arch variations is reviewed and the possible embryonic development of these branching patterns and their clinical significance is discussed briefly.

Sinan Cakirera, Ercan Karaarslanb, Murat Kayabalic and Izzet Rozanesd presented a case of agenesis of left common carotid artery in a 68-year-old female patient that was diagnosed with contrast-enhanced MR angiography (MRA) of the carotid arteries.

CONCLUSION:

Variations in branching pattern of carotid system are most common. Knowledge of these anatomical variations is essential for surgeons and radiologists to prevent complications during diagnostic and therapatic procedures.

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