

## Original article

# Variations in external carotid artery in a cadaver

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### Abstract:

**Introduction:** The common carotid arteries are the largest arteries of the both sides of the head and neck. The right common carotid artery originates from the brachiocephalic trunk and left common carotid directly from the arch of aorta. In head and neck surgery the common carotid artery (CCA) is important landmark for plane of the dissection for radical neck surgery. Aim: This paper describes an anatomical variation of the lingual artery, Superior thyroid artery, and facial artery along with the division of common carotid artery.

**Method:** This study was conducted in department of Anatomy at B.J.G.M.C. Pune, during routine dissection classes which was held for medical undergraduate students. We had dissected 60 cadavers on the both sides.

**Result:** In present study we found normal bifurcation of common carotid 35.5% on the right side and 64.2% on the left side . Low bifurcation occurred 11% on the right side and 3% on the left side and high bifurcation occurred in 78.1% cases on the right side and 21% on the left side. Origin of facial artery and lingual artery may arise as linguofacial common trunk. Superior thyroid artery arising from common carotid artery in 35% on right side, 25% on left side and 5%at the level of bifurcation.

**Conclusion:** Variations is important for the clinicians, surgeons and the radiologists.

**Key words** – External carotid artery, variations, linguofacial trunk

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### Introduction

The common carotid arteries are the largest arteries of the both sides of the head and neck. The right common carotid artery originates from the brachiocephalic trunk and left common carotid directly from the arch of aorta. In head and neck surgery the common carotid (CCA) is important landmark for plane of the dissection for radical neck surgery<sup>1</sup>.The CCA of both sides divide at the upper border of the thyroid cartilage between intervertebral disc C3 and C4 cervical vertebrae into External carotid artery ECA and internal carotid artery (ICA). The CCA may bifurcate at lower or higher level than normal level. The bifurcation can occur as high as the

hyoid bone or as low as the cricoids cartilage. Variations are important for surgical approach in the head and neck region<sup>2</sup>. Conventional angiography is most accurate technique for the diagnosis of carotid bifurcation diseases such as stenosis. The knowledge of carotid arterial system is also useful to minimize the postoperative complication in bloodless surgical field.CCA does not give any branch in the neck except terminal branches but it may give rise to the lingual artery, occipital artery, ascending pharyngeal artery and superior thyroid artery(STA). So the knowledge of the origin, course, branching pattern, of ECA and CCA and its variation is useful to E.N.T.Surgeons, Cardiac surgeon and Radiologist.

Therefore, considering its clinical and surgical importance in the head and neck surgeries and various procedures the present study was undertaken to know the variation of the level of bifurcation of CCA and branching pattern of ECA.

**Aim and Objective:** 1. To study the normal level of bifurcation and anatomical variation in bifurcation of CCA .

2. To study the normal branching pattern and anatomical variation of branching pattern of ECA .

**Material and method:**

This was a cross sectional study conducted in the department of Anatomy of B.J.M.C. Pune. Study was

conducted during 2011 to 2015. The study involved formalin embalmed 60 cadavers which were used by the undergraduate students for their routine dissection. Study included cadavers of different age groups and both sexes. Cadavers having injury to ECA and dilatation or Aneurysms of ECA are excluded. Dissection carried out according to Cunningham's Manual of Practical Anatomy in the neck region on the both sides of the cadavers using Scalpel with blade Scissor, Forceps, Gloves ,Cotton gauze and Digital camera used for photography. The data was tabulated and analyzed statistically.

**Result:**

In the present study 60 human cadavers 120 carotid specimen were studied for the level of bifurcation of common carotid artery and branching pattern of ECA in the human cadavers.

Table 1:Sex wise distribution among the study group:

Sex	Number of cases	Percentage
Male	33	55%
Female	27	45%
Total	60	100%

Present study shows 33 (55%) were male & 27 (45%) were female out of 60 human cadavers .Also present study studied 60 (50%) carotid specimen on right side & 60 (50%) carotid specimen on left side.

Table 2: Level of bifurcation of CCA on right and left side

Side	Level of bifurcation of CCA		
	High	Low	Normal
Right	20 (78.1%)	11 (90%)	29 (35.8%)
Left	6 (21.9%)	3 (10%)	51 (64.2%)
Total	26	14	80

Table 3: Distribution of branching pattern on both sides.

Name of artery	Side	ECA	LFT from CCA	CCA	bifurcation
Superior thyroid artery	Right	36 (60%)	-	21 (35%)	3 (5%)
	Left	45 (75%)	-	15 (25%)	-
Lingual artery	Right	45 (75%)	12 (20%)		3 (5%)
	Left	50 (83%)	9 (15%)	-	1 (1.5 %)
Facial artery	Right	48 (80%)	12 (20%)	-	-
	Left	51 (85%)	9 (15%)	-	-

**Discussion:**

The common carotid artery divides into the external and internal carotid arteries at the level of the superior border of the thyroid cartilage. In our study this is found to be true in 35.5% on the right side and 64.2% on the left side of cases, i.e 66.66%. Espalieu *et al.*<sup>3</sup> in 65% of cases, and Von Poisel and Golth<sup>4</sup> in 67% of cases. Lucev *et al.*<sup>5</sup> conducted a study to assess the normal level of carotid bifurcation and concluded that in 50% of cases the level of the

bifurcation corresponded to the superior border of the thyroid cartilage. In present study low bifurcation occurred 11% on the right side and 3% on the left side. i.e.12% and high bifurcation occurred in 78.1% cases on the right side and 21% on the left side. i.e. 21%. Rao et al<sup>6</sup> conducted the study and found that Carotid bifurcation occurred in 25% at the level of the inferior border of the hyoid bone and higher level of bifurcation, opposite the superior border of the hyoid bone was found in 12.5%.

Table 4 - shows comparison of site of origin of STA in various studies

	External Carotid Artery	Common Carotid Artery	Carotid Bifurcation
Takkallapalli Anitha et al	59%	21%	19%
Lucev et al	30%	47.50	22.50%
BannaM.et al <sup>8</sup>	68%	10%	22%
Present study	67%	30%	2.5%

A study conducted by Takkallapalli Anitha et al<sup>7</sup> found that the STA arises below the level of upper border of thyroid cartilage (56% on right, 66% on left side). The STA originates at the level of upper border of thyroid cartilage (30% right, 16% left) and above the level of upper border of thyroid cartilage (14% right, 18% left). Study conducted by Joshi et al<sup>9</sup> and concluded that the level of origin was above the thyroid cartilage in 87.88% on right and 84.85% on left side and in 13.64% cases level of the origin was at the same level of thyroid cartilage.

Facial artery may take origin along with the lingual artery as linguofacial trunk. In the present study 82% of facial artery arises from ECA and 18 % of linguofacial trunk was found. Lingual artery mainly takes origin from external carotid artery (80%), it arises from bifurcation of common carotid artery in (3%) and (17%) from linguofacial trunk.

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Yildirim et al (2001)<sup>10</sup>, observed a total of six (15%) linguofacial trunks in 20 adult human cadaver on both sides of the neck. Troupis et al<sup>11</sup> performed dissections on 15 cadavers and found only one common linguo-facial trunk. Bergman et al reported the linguo-facial trunk in 10-20% of cases. Zumre et al<sup>12</sup> reported linguo-facial trunk in 20% of cases, thyrolingual trunk in 2.5% and thyrolinguofacial trunk in 2.5% of the human fetuses.

#### Conclusion:

We conclude that, our study is useful for,

1. Surgeries which ligating the vessels in the head and neck region during surgery and to avoid the unnecessary complication during carotid end arterectomy.
2. Important for radiologist for the interpretation of angiogram of face and neck region.
3. To avoid complications during surgeries and with catheter insertion.

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