

## Case Report

# LEFT COMMON CAROTID ARTERY ARISING FROM BRACHIO CEPHALIC TRUNK

Supriya Jainapur <sup>\*1</sup>, Nirmala D <sup>2</sup>, G F Mavishettar <sup>3</sup>.

<sup>\*1</sup> Post Graduate student, <sup>2</sup> Associate Professor, <sup>3</sup> Professor and Head  
Department of Anatomy, JJM Medical College, Davangere, Karnataka, India.

## ABSTRACT

Arch of aorta branches into three – the Brachiocephalic trunk, the left common carotid artery and the left subclavian artery. The variations in the branching pattern of arch of aorta are usually incidental findings during surgeries and imaging studies and are important in aortic instrumentation and head and neck surgeries. In the present case report the left common carotid artery originating from the brachiocephalic trunk and its significance is discussed.

**KEYWORDS:** Arch of aorta, Left common carotid artery, Brachiocephalic trunk, variations, Aortic instrumentation.

**Address for Correspondence:** Dr. Supriya Jainapur, Post Graduate student, Department of Anatomy, JJM Medical College, Davangere, Karnataka, India. **E-Mail:** doctorsupriya1@gmail.com

## Access this Article online

### Quick Response code



**Web site:** International Journal of Anatomy and Research  
ISSN 2321-4287  
[www.ijmhr.org/ijar.htm](http://www.ijmhr.org/ijar.htm)

Received: 30 June 2014

Peer Review: 30 June 2014 Published (O): 31 July 2014

Accepted: 14 July 2014 Published (P): 30 Sep 2014

## INTRODUCTION

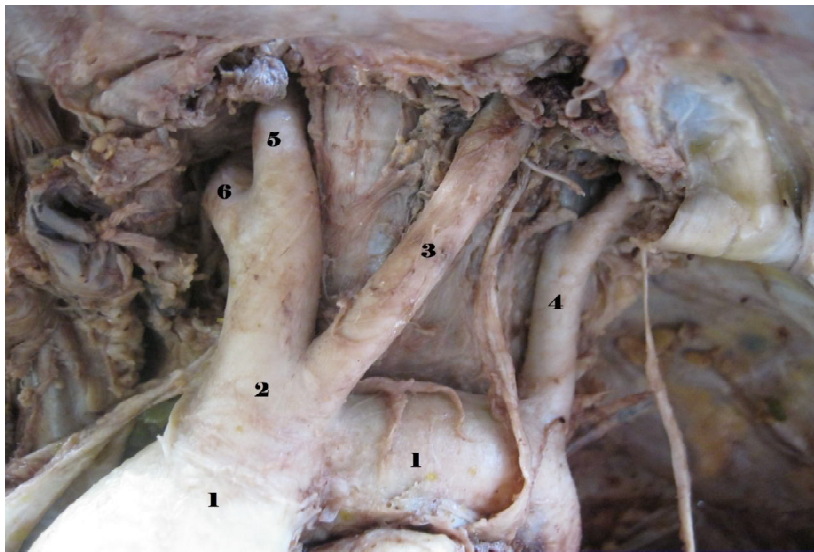
The arch of aorta is a continuation of the ascending aorta, located in the superior mediastinum. It usually branches into three – the Brachiocephalic trunk, the left common carotid artery, and the left subclavian artery. This branching pattern is found 65-80% of the population[1] These branches may branch from the beginning of arch of aorta or from the convexity of arch of aorta at varying distance. Variations in the aortic arch branches occurs mainly due to abnormal fusion or disappearance of aortic arch arteries during embryonic period[2]. Some type of aortic arch anomalies are associated with chromosome 22q11 deletion[3].

Anatomical and morphological variations of aortic arch and its branches are important in surgical and diagnostic procedures in the thorax and the neck[4]. Increasing activity in the fields of cardiac and vascular surgery has served to review interest in the developmental and adult

anatomy of the aortic arches and its great vessels. In this case report, we present a variation in the branching pattern of arch of aorta.

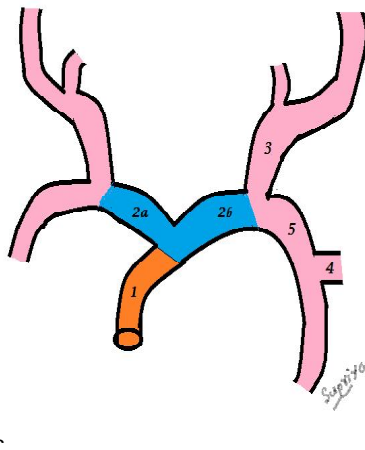
## CASE REPORT

During dissection for medical students in the department of Anatomy at J.J.M. Medical College, Davangere, the anomalous origin of left common carotid artery from Brachiocephalic trunk was observed in an adult female cadaver. The artery was finely dissected and photographed. In the present case the arch of aorta had only two branches. They originated from the upper convex surface of arch of aorta. The first branch was brachiocephalic trunk. The second branch was left subclavian artery. The left common carotid artery originated from the root of brachiocephalic trunk. The artery then crossed the trachea anteriorly from right to left side and then entered the left side of neck.



**Fig. 1:** Showing left common carotid artery arising from brachiocephalic trunk. 1-Arch of aorta, 2-brachiocephalic trunk, 3-left common carotid artery, 4-left subclavian artery, 5-right common carotid artery, 6-right subclavian artery.

**Fig. 2:** Schematic Diagram



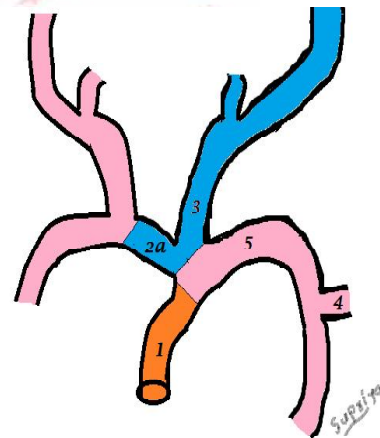
- 1 - Aortic sac
- 2a - Right horn of aortic sac
- 2b - Left horn of aortic sac
- 3 - Left common carotid artery
- 4-Left subclavian artery
- 5-Left fourth arch artery

The brachiocephalic trunk coursed 4 cm and then divided into right common carotid and right subclavian artery at right sternoclavicular joint. The further course, branching pattern and termination of these arteries were normal.

**Table 1:** Studies on incidence of left common carotid artery originating from brachiocephalic trunk reported in previous studies.

Study	Incidence of variation
Nayak SR <sup>4</sup>	4.8% (6 out of 62)
Adachi <sup>6</sup>	11% (57 out of 516)
Uchino A <sup>7</sup>	6% (141 out of 2,352)
Nitra P <sup>8</sup>	5.97% (41 out of 687)
Patil ST <sup>11</sup>	14.66% (11 out of 58)

**Fig. 3:** Schematic Diagram



- 1 - Aortic sac
- 2a - Right horn of aortic
- 3- Left common carotid artery
- 4-Left subclavian artery
- 5-Left fourth arch artery

### DISCUSSION

The aortic arch develops from the aortic sac, the left fourth aortic arch and part of left dorsal aorta. The primordial aortic arch pattern becomes modified to final arterial arrangement during 8<sup>th</sup> week[5]. Alteration in the extent of fusion process and absorption of aortic arches during embryonic period results in the variations of aortic arch branches.

The previous studies have reported various branching pattern of arch of aorta. Adachi first classified branching pattern of aortic arch by dissection of 516 Japanese cadavers as Type A where the arch of aorta has three main branches the brachiocephalic trunk, the left common carotid artery and the left subclavian artery seen in about 80% population. Adachi type B where

another 11% have a common trunk incorporating the left common carotid artery and the brachiocephalic trunk. Type C, has the left vertebral artery, a fourth branch of the arch of aorta[6]. The present case belongs to Adachi Type B. Nayak et al studied 62 aortic arches by dissection method, in their study 4.8% presented left common carotid artery arising from brachiocephalic trunk with different degree of branches[4].

Uchino et al conducted CT angiographic study on 2,351 patients, in their study left common carotid artery arose from brachiocephalic trunk in 6% of patients[7]. Study conducted by Nitra et al by CT chest of 687 patients showed left common carotid arising from brachiocephalic trunk in 5.97% of patients[8]. There is a racial factor in type-2 pattern of arch of aorta. In a study conducted by De Garis CF et al this aortic arch branching pattern was found in 25% of blacks and only 8% of whites, indicating that type-2 branching pattern is found more often in blacks[9]. These observations are important in vascular surgeries involving the structures in the superior mediastinum. If these variations are not recognised at the time of surgeries they may lead to fatal consequences.

Developmentally variations in the branching pattern can be explained as follows, in the embryonic development of heart tube and the vessels, the right and left primitive aortae are continuous with the endocardial heart tubes. The fused portion represents the aortic sac and the unfused portion remains as left and right horn of aortic sac. The left horn of aortic sac forms the part of arch of aorta between the origin of brachiocephalic trunk and left common carotid artery. So, if there is an excessive absorption of left horn of aortic sac, then it leads to anomalous origin of left common carotid artery from brachiocephalic trunk[10].

It has been reported that anomalies of the aortic arch branching pattern could lead to cerebral abnormalities by altering the pattern of flow in cerebral vessels[11]. In a study conducted on 78 arches of adult Indian cadaver by Patil.S.T. et al the type-2 pattern was found in 14.66% and they studied previous medical history of those cadavers and found that 23.5% cadavers were diagnosed with cerebro-vascular disease.

In type II pattern, origin of left common carotid artery is slightly shifted to right side so that it is incorporated with brachiocephalic trunk and comes in a straight line with ascending aorta. This may be the reason to increase blood flow in left common carotid artery. This direct (straight line) flow of blood from aorta to brain or imbalance of flow of blood on left and right side at circle of Willis may be the cause of increased incidence of cerebro-vascular diseases in cadavers having type II pattern of aortic arch[12].

## CONCLUSION

Knowledge of variations in the branching pattern of arch of aorta is of great importance in patients who have to undergo four vessel angiography, aortic instrumentation or supra-aortic head and neck surgeries. The knowledge of abnormal branches originating from aortic arch is also important in diagnosis of intra-cranial aneurysms. The vascular remodeling within aorta results in loss of structural integrity with consequent aneurysm. The knowledge of variations of brachiocephalic trunk is necessary for cardiac catheterization and to perform safely the endovascular surgery.

**Conflicts of Interests: None**

## REFERENCES

- [1]. Bergman RA. Cardiovascular system: In Bergman RA, Thomson SA, Afifi AK, Saadeh FA editors. Compendium of human anatomic variation: Urban & Schwarzenberg, Baltimore Munich; 1988, p.62.
- [2]. David J. Heart and great vessels: In Susan Standing editor. The basis of clinical practice. 39<sup>th</sup> Ed., Edinburgh: Elsevier Churchill Livingstone; 2005, p.1021-1023.
- [3]. Doff B, Mc Elhinney, Clark BJ, Weinberg PM, Kenton ML, McGinn DM et al; Association of chromosome 22q11 deletion with isolated anomalies of aortic arch laterality and branching pattern. JACC 2001; 37(8):2114-9.
- [4]. Nayak SR, Pai MM, Prabhu LV, D'Costa S, Shetty P: Anatomical organization of aortic arch variations in the India: embryological basis and review. J Vasc Bras 2006; 5:95-100.
- [5]. Bhatia K, Ghabriel MN, Henneberg M: Anatomical variations in the branches of the human aortic arch: a recent study of a South Australian population. Folia Morphol 2005; 64:217-223.
- [6]. Singh AL, Kumar V. Brachiocephalic trunk variation and abnormal left common carotid artery-a case report. Anatomica Karnataka 2012; 6(2):63-65.

- [7]. Uchino A, Saito N, Okada Y, Kozawa E, Nishi N, Mizukoshi W, et al. Variation of the origin of the left common carotid artery diagnosed by CT angiography. *Surg Radiol Anat.* 2013 May;35(4):339-42.
- [8]. Nitra P, Patiwat T, Monravee T. Aortic arch branch variations detected on chest CT. *Asian Biomedicine* Vol. 5 No. 6 December 2011;817-823.
- [9]. De Garis CF, Black IB, Riemenschneider EA. Pattern of the aortic arch in American white and Negro stocks, with comparative notes on certain other mammals. *J Anat* 1933;67:599-618.
- [10]. Moore KL, Persaud TVN. Cardiovascular system. In: Moore KL, Persaud TVN, editors. *The developing human: clinically oriented embryology.* 8<sup>th</sup> ed. Philadelphia: Saunders Elsevier.2008; 305-6, p. 316-25.
- [11]. Parakeshava G, Agios P, Stavrakas M, Stoltidou A, Tzaveas A. Left common carotid artery arising from the brachiocephalic trunk: a case report. *Cases J* 2008;1:83.
- [12]. Patil ST, Meshram MM, Kamdi NY, Kasote AP, Parchand MP: Study on branching pattern of aortic arch in Indian. *Anat Cell Biol* 2012;45:203-206.

**How to cite this article:**

Supriya Jainapur, Nirmala D, G F Mavishettar. LEFT COMMON CAROTID ARTERY ARISING FROM BRACHIOCEPHALIC TRUNK. *Int J Anat Res* 2014;2(3):485-88.

