

CASE REPORT

LEFT COMMON CAROTID ARTERY ARISING FROM THE BRACHIOCEPHALIC TRUNK: A CASE REPORT SEEN IN 4 HEARTS

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ABSTRACT: Arch of Aorta starts at the level of the Louis angle (T₄vertebra), and continues as Descending thoracic aorta at the same level. Branches arising from it are usually three (brachiocephalic trunk, left common carotid and left subclavian artery).^{1,2} In routine dissection class, we found the left common carotid artery arising as a branch from the brachiocephalic trunk in four cadavers and one of them showing left subclavian artery giving vertebral artery near the arch itself.

KEYWORDS: Arch of Aorta, Heart, Branches, and Vertebral Artery.

INTRODUCTION: The common pattern of branching of arch of aorta is separate origin of three branches i.e., brachiocephalic trunk, left common carotid and left subclavian arteries springing from the vessel's convex aspect.^{1, 2} In our routine dissection classes we came across 4 cadavers (all are male, middle aged whose past medical history was unknown and are unclaimed cadavers) out of 6, kept for dissection of thorax region (hearts), which showed left common carotid artery arising from the left surface of the initial portion of the brachiocephalic trunk and one of them also showed the left vertebral artery arising from left subclavian artery closer to the aortic arch i.e., in the superior mediastinum.

MATERIALS AND METHODS: In routine dissection in the Department of Anatomy, these variations in Hearts were found. Any other associated anomalies were looked for and the specimens are photographed.

OBSERVATION: In all the cadavers the Left Common Carotid artery originates from the initial portion of the Brachio-cephalic trunk only. In one of them, the Left Vertebral Artery originated from the left subclavian artery in the superior mediastinum and accordingly it didn't have normal origin. It coursed upward into the mediastinum and was 4-5 centimeters longer than the normal position

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Fig. 1: Showing the origin of left common carotid artery from the root of the brachio cephalic trunk



Fig. 2: The same heart showing the high origin of left vertebral Artery from left subclavian artery nearer to the arch of aorta

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Fig. 3: Showing the origin of left common carotid artery from the root of the brachio cephalic trunk



Fig. 4: Showing the origin of left common carotid artery from the root of the brachio cephalic trunk

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Fig. 5: showing the origin of left common carotid artery from the root of the brachio cephalic trunk

BCT: - Brachio cephalic trunk

LCC: - Left common carotid artery

LSA: - Left subclavian artery

LVA: - Left vertebral artery

DISCUSSION: The arch of the aorta lies behind the lower part of the manubrium sternum. It begins behind the right border of the manubrium at the level of the second costal cartilage, and extends dorsally to the left to reach the left border of the manubrium sternum. This occurs at the level of the body of T₄ vertebra.^{1, 2}

The branching of Aorta can be from the beginning of the arch, i.e., from the upper part of the ascending aorta, from the arch. The branching pattern also varies a lot as cited in Gray's Anatomy. An analysis of variation in branches from 1000 aortic arches showed the following findings: The common pattern in 65% is formed by the separate origination of three branches springing from the vessel's convex aspect: The brachiocephalic trunk, left common carotid and left subclavian arteries, in 27%, the left common carotid artery originates from the brachiocephalic trunk. In 2.5%, each of the four arteries originate independently from the arch of the aorta, while in 1.2%, right and left brachiocephalic trunks originate from here from the arch of the aorta).^{2,3,6,7}

However, Anson referred to the presence of a left common carotid artery arising from the initial portion of the brachiocephalic trunk in a frequency of 0-2%.^{3, 6, and 7}

The current case reports fall under the category of the origin of left common carotid from the initial portion of brachiocephalic trunk.

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The vertebral artery normally originates from the superior surface of the first part of subclavian artery medial to the thyrocervical trunk in the scaleno-vertebral triangle.^{1, 2}

Segments of Vertebral Artery:

1. The V1 segment; the pre-transverse or pre-vertebral segment arises from the craniodorsal, but rarely from the caudo ventral half of the subclavian artery, it is tortuous and often describes a significant loop prior to entering the transverse foramen of C6 vertebra.²
2. The second vertebral (V2) segment extends from the transverse process of C6 to where the artery exits the axis vertebra.²
3. The third vertebral (V3) segment extends from the point of exit from the axis vertebra to its entry into the spinal canal.²
4. The fourth vertebral (V4) segment is intracranial and joins with the fellow of the opposite side and terminates as the basilar artery.²

In the present study, the length of the pre-vertebral segment of left artery was greater than that of right vertebral artery as the artery originated from the beginning of the left subclavian artery in the superior mediastinum near the arch of the aorta.

The variations of vertebral artery seen usually are: -

1. The left vertebral artery may arise directly from the left common carotid or the root of the subclavian, close to the aortic arch.^{2, 3}
2. It may arise from the arch of the aorta^{2, 3}
3. There may be two left vertebral arteries. In such case, one originates from the arch of the aorta. The other from the left subclavian artery in the normal position, the latter was smaller than former.^{2, 3}

Embryology: Truncus arteriosus divided by the aortico-pulmonary septum around 4th and 5th week of IUL, divides the out flow channel of the heart into the ventral aorta and the pulmonary trunk. The aortic sac, then forms right and left horns, which subsequently give rise to the brachiocephalic artery and the proximal segment of the aortic arch, respectively. The third aortic arch forms the common carotid artery. The fourth aortic arch on the left, it forms part of the arch of the aorta, between the left common carotid and the left subclavian arteries. On the right, it forms the most proximal segment of the right subclavian artery.⁴

Usually the first part of the vertebral artery develops from the proximal part of the dorsal branch of 7th cervical inter-segmental artery proximal to the post-costal anastomosis. The second part is divided from longitudinal communications of the post costal anastomosis. In the present case, the left sixth dorsal inter-segmental artery might have persisted as the first part of the vertebral artery, and hence the left vertebral artery arises from the initial part of the subclavian artery.⁴

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Clinical Importance:

1. Knowledge of variations in the branching pattern of the aortic arch is of great importance in procedures such as in four-vessel angiography, aortic instrumentation, or supra-aortic thoracic, head and neck surgeries.⁵
2. Previous reports stated that anomalies of the aortic arch branching pattern can lead to cerebral abnormalities by altering the pattern of blood flow in cerebral vessels.⁵
3. In addition, knowledge of abnormal branches originating from the aortic arch is also important to diagnose intracranial aneurysms following subarachnoid hemorrhage.⁵
4. A variation in origin and course of the great vessels originating from the aortic arch is of great clinical value, because lack of knowledge of these variations can lead to serious surgical complications during procedures in the superior mediastinum and in the root of the neck.^{5,6,7}
5. The clinical importance of the pre-vertebral segment of the vertebral artery is that the segments are frequently affected by atherosclerosis and may be responsible of alteration in cerebral haemo-dynamics.^{5, 6, 7}
6. An abnormal origin of the vertebral artery may favor increases in the incidence of cerebral disorders.⁵
7. Evidently, knowledge of variations of all parts of the vertebral artery is important in head and neck surgery, as it may improve the outcome of skull-base and other head and neck operations and aid in the interpretation of imaging techniques.⁵

REFERENCES:

1. McVay CB. Anson and McVay Surgical Anatomy. 6th ed. WB Philadelphia: Saunders Co; 1984. Pg: 426–433.
2. William Warwick, Dyson Bannister Gray's Anatomy. 37th ed, Churchill Livingstone, London, 1989:733–734.
3. Anson BH: The aortic arch and its branches. In Cardiology. Vol. 1. New York: McGraw-Hill; 1963: 68.
4. Thomas W. sadler, Langman's medical embryology 12th ed Lippincott Williams & Wilkins, 2011 pg: 185-187.
5. Healey J, Hodge J. Surgical Anatomy. 3rd ed. Vol-2. Toronto: B.C. Decker; 1990. Pg: 110–111.
6. A variant branching pattern of the Aortic Arch: a case report by Mange Manyama, Peter Rambau, Japhet Gilyoma and William Mahalu Journal of Cardiothoracic Surgery 2011, 6:29.
7. Anatomical variation of the brachiocephalic trunk and common carotid artery in neck dissection ITEREZOTE; A. M.; MEDEIROS, A. D.; BARBOSA FILHO, R. C. C.; PETRELLA, S.; ANDRADE JUNIOR, L. C.; MARQUES, S. R. and PRATES, J. C.. Int. J. Morphol., 27(2): 601-603, 2009.

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