

ANATOMICAL VARIATION IN BRANCHES OF ARCH OF AORTA: A CASE STUDY.

Girish kulkarni¹, Shravani Kulkarni²

1Associate professor , Rachana Sharir dept , SSAM Hadapsar , Pune, 2Assistant professor, Rachana Sharir dept, ASS Ayurved college , Nashik.

Abstract:

The branch anatomy of the aortic arch varies widely between individuals. These are likely due to developmental alterations of aortic arch arteries during the embryonic period. The purpose of this study is to identify the presence of the aortic arch branch variations in the cadavers and provide useful data for intervention to radiologists, neck and thoracic surgeons. 120 cadavers have been dissected in the department of anatomy of SSAM, Hadapsar, Pune since last 15 yrs. The Normal Aortic arch branching pattern was observed in 119 cadavers. Only in one case, variations were seen. In the present case, four branches were observed in the arch of aorta. One extra branch was seen in between the left common carotid and left Subclavian artery. Knowledge of these variations could help surgeons to identify and protect the branches of arch of aorta during surgery and investigatory procedures such as Colour Doppler and 2 D echo.

Keywords : Arch of Aorta, Branches, Variations.

Introduction :

The aortic arch is a continuation of the ascending aorta and is located in the superior mediastinum. Three branches, the Brachiocephalic trunk, left common carotid artery and left Subclavian artery usually branch from the aortic arch. These branches may branch from the beginning of the arch or the

upper part of the ascending aorta by varying distances between them. The Brachiocephalic trunk later divides into right common carotid artery and right Subclavian artery.² Variations in the branching pattern of the aortic arch range from differences in the distance between origins of different branches to number of branches. Some articles have reported variations in the aortic arch

branching pattern which includes left common carotid artery originating from the Brachiocephalic trunk; right common carotid artery and right Subclavian artery originating individually from the aortic arch . Additionally, left common carotid artery and left Subclavian artery may have a common origin in the form of the left Brachiocephalic trunk from the aortic arch. The left vertebral artery may also arise between the left common carotid artery and left Subclavian artery.¹ The anomalies of branches arising from the aortic arch are due to variations in the extent of the fusion process and absorption of some of the aortic arches into the aortic sac. Increase and decrease in number of branches arising from the arch depend on such process.⁴

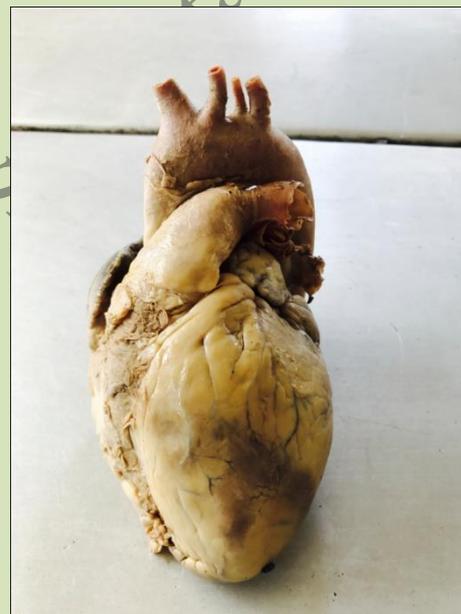
This study was conducted for a period of 15 years. The purpose of the study was to measure the percentage of variation in the branching pattern of arch of aorta. In the present study the most common aortic arch branching pattern was found in 119 cadavers, additional artery that is four branches were observed in only one case. So in this study attempts have

been made to identify and name this extra branch of arch of aorta.

Case report :

The present report describes anomalies in branching of the aortic arch identified in a routine dissection of the chest in a 60-year old male cadaver in the Department of Anatomy, Sumatibhai Ayurved Mahavidyalay, Hadapsar ,Pune.

From the records, he had no past medical history suggestive of cardiovascular disease. His weight and height were 75 kg and 155cm respectively. The cause of death was non-cardiovascular disease. The cadaver was formalin-fixed. After removal of the anterior thoracic wall, fat tissue and the pericardium covering the ascending aorta and the great vessels, one extra artery was found originating in between Left Subclavian and left common carotid artery.. This artery then travelled along with Left common carotid upto the neck in the posterior triangle of neck and continued as Left vertebral artery. None of the laboratory or radiological investigation detected this variation prior to death.

Photo images of dissected heart :**Discussion :**

Three classical branches spring from convex aspect of the aortic arch: the Brachiocephalic trunk, left common carotid artery and left Subclavian artery . This branching pattern is the most common accounting for about 65% of aortic arch branching pattern. However, variation in the aortic arch

branching pattern has been reported widely . The most common was two branches namely the left Subclavian artery and a common stem that gave rise to the Brachiocephalic trunk and left common carotid artery . Other variations were four large arteries branching separately, the remaining showed a great variety of patterns,

the most common being symmetrical right and left brachiocephalic trunks . Other variations include the left vertebral artery arising between the left common carotid and the Subclavian. More rarely, the common carotid artery may be absent on one or both sides, the external and internal carotid arteries arising separately, or both carotids and one or both vertebral may be separate branches. The left common carotid artery varies in origin more than the right. The vertebral artery is classically described as first branch of ipsilateral subclavian artery. However, multiple variations in the origin of the vertebral artery have been reported in the literature, the most frequent variant is the left vertebral artery arising directly from the aortic arch between the left common carotid artery and Left Subclavian artery .Variation in the distance between origin of these vessels has also been reported, the most frequent being approximation of the Left common carotid artery to the Brachiocephalic trunk.³

Developmental anomalies in aortic arch branching pattern arise from unusual patterns of development of the embryonic aortic arch system of the pharyngeal arches, such that there may be persistence of aortic arches that normally disappear or

disappearance of parts that normally persist . Several kinds of uncommon defect occur when arches persist instead of becoming obliterated or vice versa. The proximal part of the third aortic arch normally gets extended and absorbed into the left horn of aortic sac. If it gets absorbed into the right horn of the aortic sac, it can lead to anomalies where the Left common carotid artery arises from the brachiocephalic trunk. Origin of vertebral arteries from the aorta suggests that part of the aortic arch arises from the left 7th inter-segmental arteries or there was increased absorption of embryonic tissue of the Left Subclavian artery between origin of aortic arch and the Vertebral artery. These two scenarios could explain the findings in the case described in this study.

Although anomalous origins of the aortic arch branches are merely anatomic variants, knowledge of variations in the branching pattern of the aortic arch is of great importance in patients who have to undergo four-vessel angiography, aortic instrumentation, or supra aortic thoracic, head and neck surgery . 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. In addition,

knowledge of abnormal branches originating from the aortic arch is also important in the diagnosis of intracranial aneurysms following subarachnoid hemorrhage. A variant of origin and course of a great vessel arising from the aortic arch is of great clinical value, because lack of knowledge of these variations may cause serious surgical complications during procedures occurring in the superior mediastinum and the root of neck.

References :

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In the present case, the extra artery was finally labeled as Left vertebral artery which is found to be arising in between left Subclavian and left common carotid.

Conclusion :

The extra artery found between left common carotid and left Subclavian arising from arch of aorta was labeled as left vertebral artery.

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