

Case Report

Left common carotid artery arising from brachiocephalic trunk and their aberrant course displacing trachea

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ABSTRACT

Bovine arch commonly refer a group of congenital variations in the branches of arch of aorta, in which there is aberrant origin of left common carotid artery. These are usually detected incidentally, however rarely they can cause dysphagia lusoria. We report a case of bovine arch and aberrant left common carotid artery in a 62 years old female who had come with complaint of mild dyspnea. On radiograph there was superior mediastinal widening and shift of trachea to right side. CT scan was advised for further evaluation. On CECT there was only two main branches arising from arch of aorta, brachiocephalic trunk and right subclavian artery. There was aberrant origin of left common carotid artery seen from brachiocephalic trunk. The brachiocephalic trunk was very tortuous and displacing trachea to right side.

Keywords: Bovine arch, Aorta, Brachiocephalic, Innominate, Common carotid, Branches

INTRODUCTION

The most common pattern of aortic arch branches in human seen as three branches arises from arch of aorta. Common origin of brachiocephalic and left common carotid artery is referred as bovine arch. In rare cases the left carotid artery arise from brachiocephalic trunk after 1cm of its origin from arch of aorta.

These anomalies or variation in the branching pattern are due to variation in the fusion process and absorption of some of the aortic arch into the aortic sac.¹ Anatomical variation in the branching pattern or arch of aorta is important for planning the diagnostic and surgical intervention procedure of the chest and neck.

CASE REPORT

A 62 years old female had come in to the hospital with complaints of mild dyspnea. On examination her chest was clear. Postero-anterior radiograph of chest was

advised which revealed a superior mediastinal widening with compression of trachea to right side (Figure 1).



Figure 1: Anteroposterior radiograph of 62 years old female which is showing shift of trachea to right side with superior mediastinal widening.

CECT scan of thorax was advised which was revealed there were only two great vessels were seen arising from arch of aorta, brachiocephalic trunk (innominate artery) and left subclavian artery (Figure 2).



Figure 2: 3-D MIP of 62 years old female showing least common variant of aortic arch branching pattern. Left common carotid artery (white arrow) is arising from brachiocephalic artery after 1.8cm from it's origin. Brachiocephalic then distally divide into right common carotid artery (yellow arrow) and right subclavian artery (green arrow).The bovine arch (brachiocephalic artery which is giving origin to left common carotid) is very tortuous in course and displacing trachea to right side. On left side aortic arch gives left subclavian artery (Blue arrow) which further branching into left vertebral artery.

Left common carotid artery was originating from brachiocephalic trunk at 1.8cm distance after brachiocephalic origin from aorta (Figure 2).

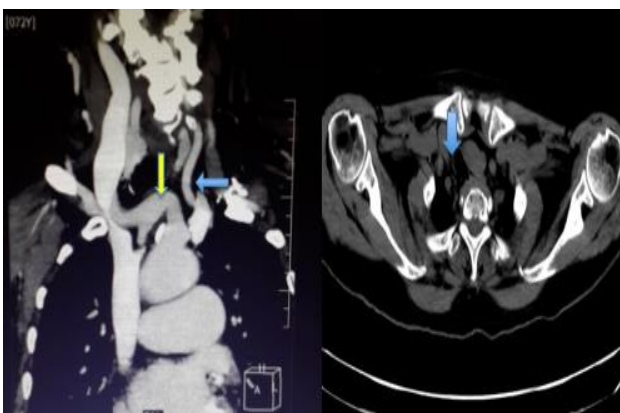


Figure 3: CECT thorax coronal reconstruction showing tortuous course of the brachiocephalic trunk (yellow arrow) displacing trachea to right side. On left side left subclavian seen arising from arch of aorta.

Brachiocephalic trunk (innominate artery) was very tortuous and its course from left side of trachea to extend to right side and pushing trachea to left side (Figure 3). On right side it divided into right common carotid and right subclavian artery.

DISCUSSION

Most common branching pattern of aortic arch in human is three branches arise from arch of aorta, which is considered as normal. First branch is innominate artery, which divides into right subclavian and right common carotid artery. Second branch is common carotid artery and third is left subclavian artery. In a study on branching pattern of aorta in Indian circumstances done in the 62 cadavers and they found three branch aortic arch in 91.4%, in 9.6% abnormality was found.¹ In 4.8% cases left common carotid arising from brachiocephalic trunk.¹

“Bovine arch” is a common anatomic variation of the aortic arch branching. In this there is a common brachiocephalic trunk, from which both the common carotid arteries and the right subclavian artery arise from a single trunk off the arch of aorta.² It occurs in approx. 10 to 22% of individuals and accounts for more than two thirds of all arch vessel anomalies.^{3,4} Recently, a naming scheme has been postulated for naming the aortic arch variations.⁵ The remaining anomalies of the main branches account for <3% of arch vessel anomalies.²

In the classical configuration, the aortic arch is left sided and the most common branching pattern comprises of three great vessels; first branch is the brachiocephalic trunk, then the left common carotid artery, and last is the left subclavian artery from right to left. The brachiocephalic trunk divides into right subclavian artery and right common carotid artery. This branching pattern occurs in 64.9-94.3% of the cases and it is described as “normal”.^{1,2,7,8}

Variations range from differences in the origins of different branches to the number of branches [8]. Development of the aorta occurs during the third week of gestation.¹ Six pairs of branchial arch arteries, develop between the ventral and dorsal aortae. Persistence of these segments of the aortic arches which normally regress or the disappearance of the segments that normally remains, or both leads to such variations.^{1,5} Anatomical variations of aortic arch are important before any diagnostic, surgical, and interventional procedures of the thorax and neck.

The most common variation is with two branches of the aortic arch i.e. brachiocephalic with left common carotid artery and left subclavian artery.³ This type is also known as “bovine aortic arch”.^{3,4,9} It is a misnomer as this variation does not resemble the aortic arch of the cattle which has only one branch that branches into right subclavian artery, a common trunk for the common carotid arteries and left subclavian artery.³

Clinically the symptoms due to this variation have been reported and mostly due to the widening of the mediastinum.¹⁰ Developmentally, it may be explained when aortic sac fails to bifurcate, brachiocephalic trunk and left common carotid artery will join to aortic sac directly resulting in bifurcated trunk or common trunk giving origin to left common carotid artery.^{5,11}

Variations

- Common origin of the innominate artery and left common carotid artery. It replaces the misnomer of a “bovine” arch. In this, the innominate artery and the left common carotid artery have a common origin. Therefore, only two great vessels are seen originating from the aortic arch. This branching pattern is found commonly in blacks, and overall in approximately 13% of patients.¹¹
- Origin of the left common carotid artery from the innominate artery. This variant is similar to the previous variation, except that the left common carotid artery originates from the innominate artery more distally, rather than as a common trunk. The left common carotid artery originates at an average distance of less than 1 cm (max. 2.5cm), from the aortic arch from the innominate artery. This type of variant was seen in our case. This variation also occurs more commonly in blacks, with an overall in 9% in the general population.^{11,12}

CONCLUSION

Variations of branching pattern of arch of aorta frequently seen as incidental findings. These variations are of relevance when performing angiography or endovascular procedures.

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