SAS Journal of Medicine
Abbreviated Key Title: SAS J Med
ISSN 2454-5112
Journal homepage: https://saspublishers.com

OPEN ACCESS

Radiology

Truncus Bicarotidus and Arteria Lusoria: A Rare Birth Defect

Ondima Laurent Hermann Marion[1*], Akdi Khaoula[1], Boutakioute Badr[1], Ouali Idrissi Mariem[1], Cherif Idrissi El Ganouni Najat[1]

[1]Department of Radiology, AR-RAZI Hospital, CHU Mohammed VI, Cadi Ayyad University, Marrakech, Morocco

DOI: 10.36347/sasjm.2023.v09i07.004 | **Received:** 21.04.2023 | **Accepted:** 25.05.2023 | **Published:** 17.07.2023

***Corresponding author:** Ondima Laurent Hermann Marion
Department of Radiology, AR-RAZI Hospital, CHU Mohammed VI, Cadi Ayyad University, Marrakech, Morocco

Abstract **Case Report**

We present the case of a 50-year-old woman who underwent a CT scan of the chest as part of a surveillance examination during which a congenital anomaly of the branches of the aortic arch was discovered. It was a bicarotid trunk associated with an aberrant right subclavian artery, with no other abnormal vascular arrangement. This rare type of anomaly is usually discovered in childhood or when symptoms appear. Our patient had no knowledge of an episode of dyspnea-type respiratory disorder or dysphagia-type digestive disorder. This anomaly had never been reported to him. Educating clinicians about this anomaly is important for cardiologists and interventional radiologists given the growing number of cases.

Keywords: Bicartodian truncus; Arteria lusoria; Imaging.

Copyright © 2023 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Advances in cardiac and great vessel interventional and surgical techniques require precise knowledge of the branching pattern of the vessels arising from the aortic arch [1]. Since then, several branching patterns have been reported, including a combination of a bicarotid common trunk associated with the aberrant right subclavian artery (arteria lusoria), which is rarely reported, with an estimated incidence between 0.7 % and 2.5% depending on the studies [2, 3]. It is most often asymptomatic and discovered incidentally, but in some cases it can be symptomatic and lead to difficulties in clinical practice. The interest of this report is to alert clinicians, surgeons and radiologists to the attention of this entity.

REPORT BOX

A 50-year-old woman, with no particular notable history, was admitted to our department as part of a surveillance examination for left breast neoplasia. During the interview, the patient tells us that she never had episodes of dyspnoea, wheezing, cyanosis or dysphagia. Computed tomography with injection of contrast product showed an anomalous ramification of the aortic arch, the first branch corresponding to the common trunk of carotid arteries or truncus bicarotidus, with a diameter of 20 mm and an estimated height of 11 mm, which divides into the right and left carotid; The second branch was the left subclavian artery with a normal course; And the third branch, the right subclavian artery, with an anteroposterior diameter of 12 mm, which has an abnormal path passing through the retro-oesophageal to continue at the level of the upper limb (arteria lusoria) (figures 1; 2; 3; 4; and 5). The origin of the vertebral arteries has a modal arrangement (coming from the subclavian arteries). However, no other anomaly in layout had been objectified elsewhere.

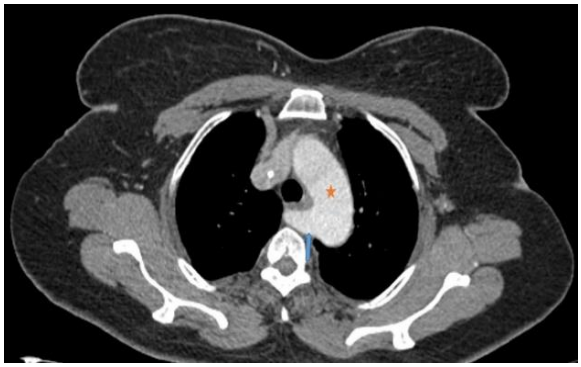

Figure 1: Thoracic CT in axial section: visualization of the right subclavian artery (arrow) with a posterior emergence at the level of the aortic arch (star) and a retroesophageal path

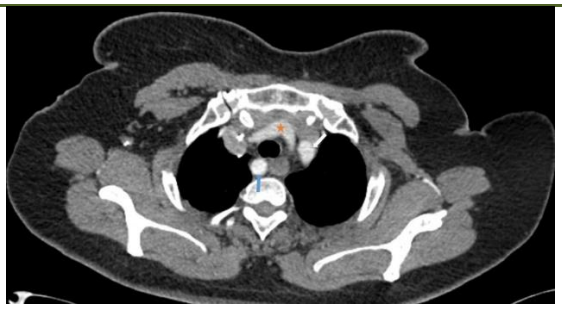

Figure 2: Thoracic CT in high axial section: presence at the level of the supra aortic trunks of a first branch (star) corresponding to the common trunk of the right and left common carotids; as well as a second (white arrow) corresponds to the left subclavian artery. Note the continuity of the course of the right subclavian artery (blue arrow)

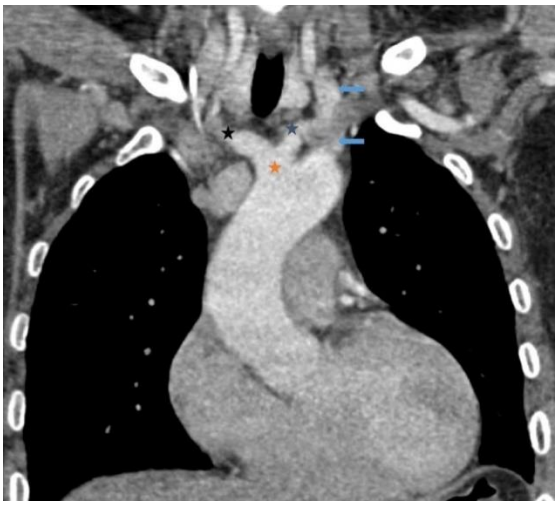

Figure 3: Chest CT in oblique coronal section: visualization of the aberrant right subclavian artery (blue arrow), bicarotid common trunk (orange star) subdividing into right common carotid artery (black star) and left (grey star)

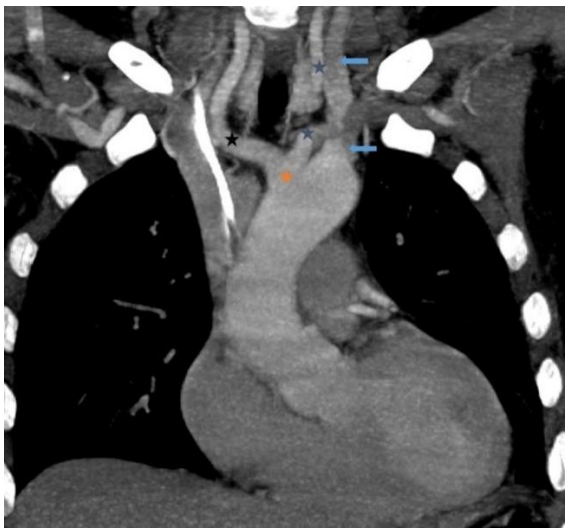

Figure 4: Chest CT, oblique coronal section with MIP: visualization of the aberrant right subclavian artery (blue arrow), bicarotid common trunk (orange star) subdividing into right common carotid artery (black star) and left (grey star)

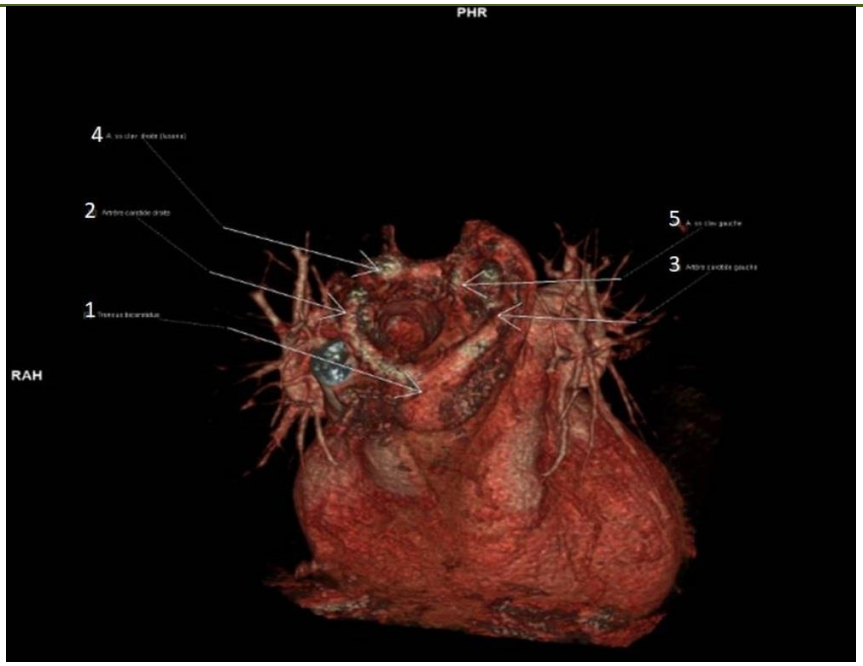

Figure 5: 3D image taken in our patient shows a bicarotid trunk (1) giving rise to the right (2) and left (3) carotid arteries. Retro-oesophageal visualization of the right subclavian artery (4) and of a normal course of the left subclavian artery (5)

DISCUSSION

The aorta is the main artery of the left ventricle and is divided into two parts, one ascending and the other descending. In about 80% of individuals, three branches arise from the aorta: The brachiocephalic trunk (first branch) divides into 2 branches, the right subclavian and common carotid; The left common carotid artery (second branch); The left subclavian artery is the last branch [4,5].

A thorough understanding of the embryonic development of the aortic arch and its branching patterns is essential to fully understand vascular variation [7]. During the 8th week of intrauterine life, the aortic arch and its branches take their final shape, following the modelling, development and regression of the 6 pairs of embryonic arteries of the branchial arch of the aortic sac. . Periods during which anatomical variations may occur [7].

Bi-carotid trunk is an extremely rare anomaly of the aortic arch, with a reported prevalence of <0.1% in isolation. It results from the persistence of the third pair of the primitive aortic arch [4,6]. In contrast, abnormal embryonic development of the primitive aorta and aortic arch results in the formation of the aberrant abnormal subclavian artery (ARSA) [5]. The proximal part of the right subclavian artery arises from the fourth artery of the right aortic arch. As for its distal part, it was due to an involution of the right dorsal aorta and of the seventh right intersegmental artery issuing from the descending aorta. In case of aplasia of the right fourth aortic arch, the seventh intersegmental artery remains connected to the aortic arch in its descending segment and the ARSA forms the last aortic branch. In most cases, ARSA passes behind the trachea and esophagus [5].

The combination of bicarotid trunk and ARSA is a rare entity. Data from the literature report on 0.5 to 2% of ARSA discovered, only 20% of these cases have an associated bicarotid trunk, hence a combined prevalence estimated at <0.05% [8]. The bicarotid trunk and the arteria lusoria are usually associated with other anatomical variations, such as the nonrecurrent laryngeal nerve and the right aortic arch. In addition, they may be associated with a number of cardiac abnormalities (coarctation of the aorta, interruption of the aortic arch, tetralogy of Fallot, truncus arteriosus, transposition of the great arteries, and ventricular and atrial septal malformations) , genetic disorders (Downs, Edwards and DiGeorge syndromes), aneurysms and arterioesophageal fistulas [9]. Our patient had no other vascular abnormalities.

Generally, patients with ARSA or bicarotid trunk are asymptomatic. However, ARSA can cause symptoms in three potential situations [10]:

1) when the esophagus and the trachea are compressed between the ARSA in the posterior position and the carotid arteries which emerge from a common trunk in the anterior position, this is the case of the coexistence of the truncus bicarotidus and an ARSA limiting thus their mobility,
2) In case of ARSA aneurysm,
3) And in the presence of hardening of the arteries (for example, atherosclerosis or fibromuscular dysplasia).

The most common symptom is dysphagia due to the retroesophageal pathway of Arteria lusoria, also clinically called dysphagia lusoria, more often accompanied by weight loss. If, on the other hand, ARSA passes between the trachea and the esophagus, dyspnea may occur. Other symptoms may be encountered such as stridor, retro-sternal pain, cough, recurrent pulmonary infections, gastralgia, back pain and numbness of the right upper limb [5,7]. In the literature, some studies have reported cases of spontaneous ruptures, dissections, increased risk of thrombosis and formation of intracranial aneurysms, which may be related to turbulent flow in an aberrant origin [7].

As for the bicarotid trunk, although rare, it has been described as responsible for tracheal compression with dyspnea, and in some cases, ischemic stroke [5-9]. The diagnosis of bi-carotid common trunk and ARSA is often made incidentally during a routine examination, a pathological exploration report, but also during a cardiac catheterization or during a autopsy [11]. CT angiography and angio-MRI represent the gold standard of the diagnostic approach allowing confirmation of the diagnosis and optimal visualization of the anatomy of the aortic arch [5].

ARSA and bi-carotid common trunk are normal anatomical variants that do not require treatment when the patient is asymptomatic. On the other hand, in the presence of symptoms, a symptomatic treatment is proposed (anti reflux, prokinetics). For cases with more severe symptoms, the literature reports the need for endovascular and even surgical intervention [11].

CONCLUSION

Truncus bicarotidus and arteria lusoria combination is a rare entity that can be diagnosed and assessed using various imaging modalities including echocardiography, CT angiography, and MRI angiography. Imaging plays a crucial role in the management of the latter, as it allows an accurate diagnosis as well as the monitoring and planning of surgical interventions if necessary in very symptomatic patients.

Conflict of interest

The authors declare no conflict.

REFERENCES

1. Reinshagen, L., Vodiskar, J., Mühler, E., Hövels-Gürich, H. H., & Vazquez-Jimenez, J. F. (2014). Bicarotid trunk: how much is “not uncommon”?. *The Annals of Thoracic Surgery*, *97*(3), 945-949.
2. Ma, Z., Han, J., Li, H., & Guo, K. (2018). A unique variation with five branches of the aortic arch. *Interactive CardioVascular and Thoracic Surgery*, *26*(1), 165-166.
3. Natsis, K., Didagelos, M., Manoli, S. M., Papathanasiou, E., Sofidis, G., & Anastasopoulos, N. (2011). A bicarotid trunk in association with an aberrant right subclavian artery. Report of two cases, clinical impact, and review of the literature. *Folia morphologica*, *70*(2), 68-73.
4. Meena, D. (2014). Aberrant right subclavian artery in association with common trunk of both carotid arteries: Diagnosis with CT. *West African Journal of Radiology*, *21*(2), 80.
5. Hanžič, N., Čizmarević, U., Lesjak, V., & Caf, P. (2019). Aberrant right subclavian artery with a bicarotid trunk: The importance of diagnosing this rare incidental anomaly. *Cureus*, *11*(11).
6. Kucukdagli, A. C., Tamura, K., Stickley, C., Hong, T., Lozanoff, B. K., Labrash, S., & Lozanoff, S. (2016). Computer model of an aberrant right subclavian artery (arteria subclavia dextra lusoria). *Int J Anat Var (IJAV)*, *9*, 95-99.
7. Buffoli, B., Verzeletti, V., Hirtler, L., Rezzani, R., & Rodella, L. F. (2021). Retroesophageal right subclavian artery associated with a bicarotid trunk and an ectopic origin of vertebral arteries. *Surgical and Radiologic Anatomy*, *43*(9), 1491-1495.
8. Tsai, I. C., Tzeng, W. S., Lee, T., Jan, S. L., Fu, Y. C., Chen, M. C., ... & Chen, C. C. C. (2007). Vertebral and carotid artery anomalies in patients with aberrant right subclavian arteries. *Pediatric radiology*, *37*, 1007-1012.
9. Leite, T. F. D. O., Pires, L. A. S., Cisne, R., Babinski, M. A., & Chagas, C. A. A. (2017). Clinical discussion of the arteria lusoria: a case report. *Jornal vascular brasileiro*, *16*, 339-342.
10. Thompson, J. L., & Burkhart, H. M. (2016). Translocation of an aberrant right subclavian artery with resolution of dysphagia lusoria. *The Annals of thoracic surgery*, *102*(1), e65-e67.
11. Norris, C. R., Wilson, C. A., & Lin, M. C. (2021). Truncus Bicaroticus With Arteria Lusoria: A Rare Combination of Aortic Root Anatomy Complicating Cardiac Catheterization. *Federal Practitioner*, *38*(2), 84.