

## Case Report

# Bilateral Aberrant Vertebral Arteries: An Extraordinary Case

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### Abstract

Vertebral arteries (VAs) arise as the first branch of the ipsilateral subclavian artery. Recently, varying number of aberrant VA types has been reported; extraordinarily, in our case, both VAs have derived directly from the aortic arch at which distal to the origin of the left subclavian artery (LSA). In our case, the fourth branch of the aortic arch was the left VA and the fifth branch was the right VA. To the best of our knowledge, this is the second report in the literature showing an abnormal origin of both the right and left VAs originating distal to the origin of the LSA. We have presented here an extremely rare case of aberrant right and left VAs in one patient.

**Keywords:** Aberrant, aortic arch, bilateral, vertebral artery

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Vertebral artery (VA) is the first branch of the subclavian artery, courses bilaterally along the neck to supply the brainstem and cerebellum.<sup>[1]</sup> Aberrant origin of bilateral VAs is an extremely rare vascular variant which can be important information for patients undergoing vascular surgery or neck dissection.<sup>[1, 2]</sup> We have reported a case of 64-year-old male patient with aberrant right and left VAs.

### Case Report

A 64-year-old male patient who has no known history of disease was admitted to our hospital with chest pain. Computed tomography angiography (CTA) was performed at the time of initial diagnosis for suspected aortic dissection. Aberrant left and right VAs originating directly from the aortic arch were found coincidentally during the search for aortic dissection on CTA. Axial CT scans demonstrated that aberrant VA has retroesophageal course which is similar to aberrant right subclavian artery (ARSA) and extending to the skull base different from ARSA (Fig. 1). On three-dimensional volume-rendered CTA images displayed aberrant

right and left VAs originating from the distal of the aortic arch (Fig. 2). The fourth branch of the aortic arch was the left VA and the fifth branch was the right VA. Furthermore, a dilatation of proximal part of the right VA evocative of a Kommerell diverticulum was seen (Fig. 2).

### Discussion

VAs are classically the first ascending branch of the ipsilateral subclavian arteries.<sup>[1]</sup> The left VA derived from the aortic arch is a common anatomic variation of VA with a reported frequency of 2.4–5.8% in several large autopsy series.<sup>[1]</sup> Yuan has reported that frequency of aberrant left VA is 85.6% of all VA anomalies.<sup>[2]</sup> Aberrant right VA is rarely seen and usually coursing retroesophageally which is similar to ARSA.<sup>[3]</sup> Bilateral aortic origin of VAs represents an extremely rare anomaly.<sup>[2, 4]</sup> A great variety of aberrant VA's origin has described.<sup>[1]</sup> Extraordinarily, in our case, both VAs have derived directly from the aortic arch at which distal to the origin of the left subclavian artery (LSA). To the best of our knowledge, this is the second reported case in the

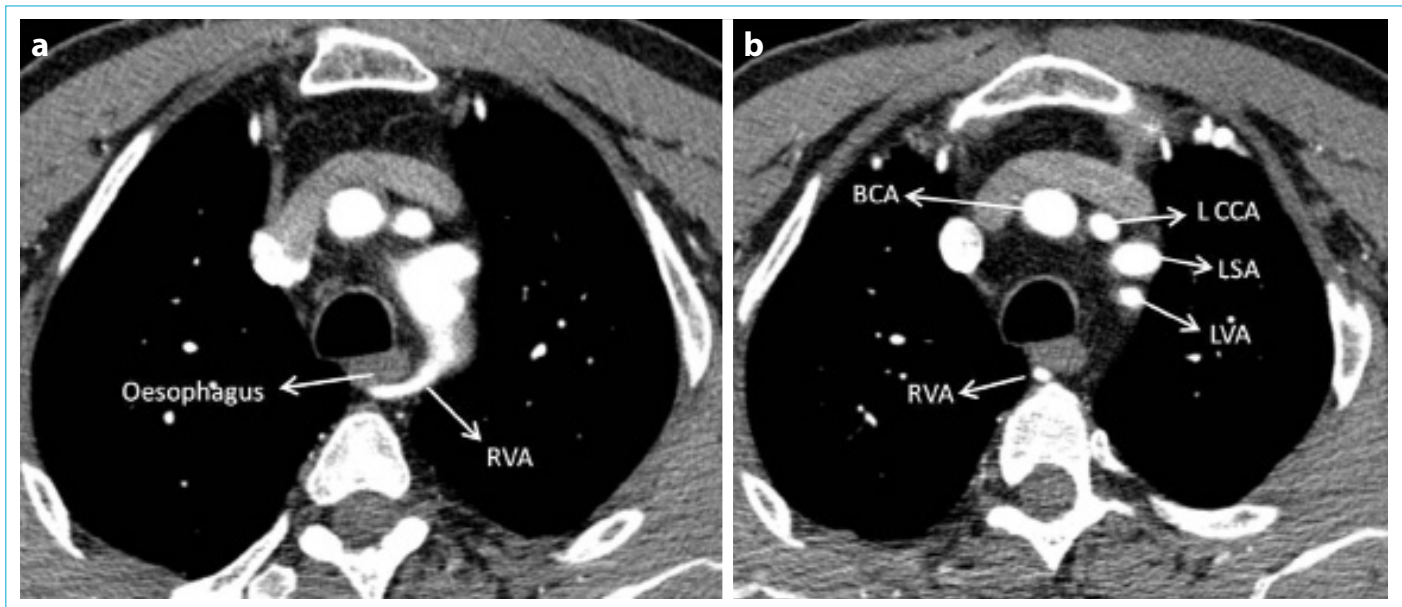
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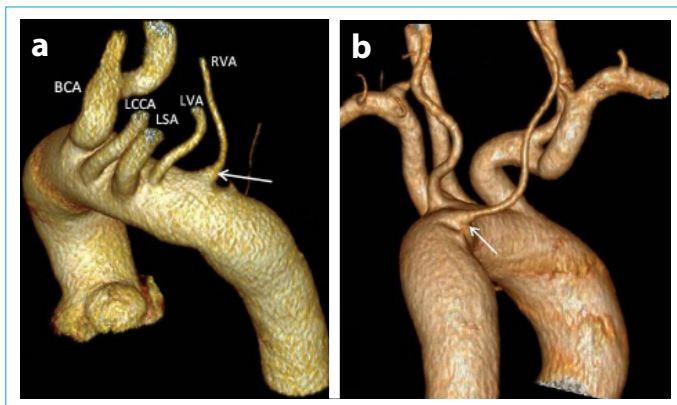
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**Figure 1 (a, b).** Axial images show the retroesophageal course of the aberrant right vertebral artery, which indents the esophagus posteriorly. **(a)** The left vertebral artery is also have aberrant origin. **(b)**

LCCA: Left common carotid artery; LSA: Left subclavian artery; LVA: Left vertebral artery; RVA: Right vertebral artery.



**Figure 2 (a, b).** Anterior **(a)** and posterior **(b)** aspect, three-dimensional volume-rendered computed tomography images show the aortic arch and supra-aortic vessels which are brachiocephalic artery, left common carotid artery, left subclavian artery, aberrant left vertebral artery, and aberrant right vertebral artery, consecutively. The fourth branch of the aortic arch is the left vertebral artery and the fifth branch is the right vertebral artery. Note the dilatation of proximal part of the right vertebral artery evocative of a Kommerell diverticulum (arrow).

BCA: Brachiocephalic artery; LCCA: Left common carotid artery; LSA: Left subclavian artery; LVA: Left vertebral artery; RVA: Right vertebral artery.

literature showing an abnormal origin of both VAs which are distal to the origin of LSA.<sup>[1]</sup>

Aortic arches and branches form from the fusion of the dorsal and ventral aorta, third and fourth branchial arches, and C7 intersegmental artery. VAs are formed by longitudinal anastomosis of C1-C7 intersegmental arteries between

the 33<sup>rd</sup> and 55<sup>th</sup> days of intrauterine life. C7 intersegmental artery has an important role in both forming subclavian artery and developing normal origin of VAs.<sup>[2]</sup>

In the setting of the left intersegmental artery persistence, the left VA originates from aortic arch between the left main carotid artery and LSA. Persistency of the left C6 intersegmental artery leads to aberrant left VA originating between the left main carotid artery and LSA.<sup>[2]</sup> The main reason of the left VA arising from distal to LSA is the persistence of C8 intersegmental artery. The right VA originated from C8 instead of C7 causes more distal origin of the left VA as the last branch of the aortic arch.<sup>[5]</sup>

Aberrant VA is usually asymptomatic. Dysphagia lusoria resulting from vascular compression of esophagus can be seen in only a small percentage of aberrant right VA cases.<sup>[2]</sup> CT, CTA, or conventional angiography are the imaging modalities used in the diagnosis and visualization of the anatomy.

## Conclusion

It is important to clarify the anomalous origin of VAs from the arch, particularly in patients undergoing vascular surgeries or endovascular interventions for thoracic aortic aneurysms and dissections. Diagnostic imaging plays a critical role in the evaluation of these vascular anomalies.

## Disclosures

**Informed consent:** Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

**Authorship Contributions:** Concept – H.E.; Design – H.E.; Supervision – H.E.; Materials – M.N.A., F.Z.A.; Data collection &/or processing – M.N.A.; Analysis and/or interpretation – H.E.; Literature search – H.E.; Writing – M.N.A.; Critical review – H.E.

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