

# ANOMALOUS ORIGIN OF BOTH VERTEBRAL ARTERIES COMBINED WITH ABERRANT RIGHT SUBCLAVIAN ARTERY AND TRUNCUS BICAROTICUS

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## ABSTRACT

We present a 50-year-old woman who was admitted to our institution with headache. Magnetic resonance angiography examination revealed truncus bicaroticus, aberrant right subclavian artery and bilateral vertebral artery anomalies in which the right vertebral artery and left vertebral artery originates from right common carotid artery and aortic arch

respectively. To our knowledge, coexistence of these anomalies is the first report in the English literature. The awareness of these variations is of great importance especially in endovascular intervention and head and neck surgery.

**Key Words:** Vertebral artery anomaly, aortic arch anomaly, magnetic resonance angiography *Nobel Med 2012; 8(3): 124-126*

## TRUNKUS BİKAROTİKUS VE ABERAN SAĞ SUBKLAVİYAN ARTER İLE BİRLİKTELİK GÖSTEREN HER İKİ VERTEBRAL ARTER ORİJİN ANOMALİSİ

### ÖZET

Baş ağrısı şikayeti ile hastanemize başvuran 50 yaşında kadın olgunun, manyetik rezonans anjiyografi incelemesinde saptanan, supraaortik vasküler yapılarla ait kombine anomalilerini sunuyoruz. Olguda aberan sağ subklavyan arter, ana karotid arterlerin tek kök olarak aorttan çıktığı trunkus bikarotikus, arkus aortadan kay-

naklanan sol vertebral arter ve sağ ana karotid arterden kaynaklanan sağ vertebral arter anomalilerinin birlikteliği görüldü. Bilgilerimize göre bu şekildeki anomali kombinasyonu literatürde ilk olarak görülmektedir.

Bu tip vakalarda, özellikle günümüzde artan tanısal anjiyografi, endovasküler tedavi uygulamaları ve baş boyun cerrahisi öncesinde anomalinin farkında olunması büyük önem taşımaktadır.

**Anahtar Kelimeler:** Vertebral arter anomalisi, aortik ark anomalisi, manyetik rezonans anjiyografi *Nobel Med 2012; 8(3): 124-126*

## INTRODUCTION

Anomalies of the supraaortic great vessels are incidental findings during angiographic procedures, because most of the cases are clinically asymptomatic. Anomalous origin of both vertebral arteries concomitant with truncus bicaroticus is extremely rare. To our knowledge coexistence of these anomalies have not been reported to date in the English literature. Awareness of these variations is of clinical importance prior to vascular surgery and endovascular intervention. We discuss the possible embryologic development of this anomaly combination and related literature briefly.

## CASE REPORT

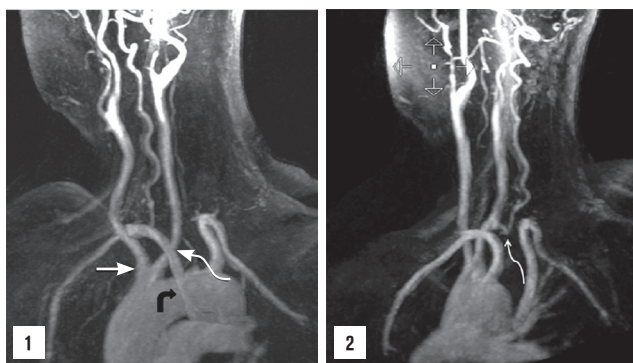
A 50-year-old woman was admitted to our hospital with the complaint of headache for about a month. Neurological examination was normal. During lumbar puncture high cerebrospinal fluid pressure was observed. Subsequently, magnetic resonance imaging (MRI) of the brain, cranial and cervical 3D contrast enhanced magnetic resonance angiography (MRA) and magnetic resonance venography (MRV) were performed. Partial thrombus detected in the left internal jugular vein and the left sigmoid sinus on MRV imaging. Following appropriate treatment, symptoms of the patient resolved. In addition, the source and maximum intensity projection (MIP) images incidentally revealed that the right subclavian artery (RSCA) originated from the aortic arch as the last branch, right vertebral artery (VA) originated from the right common carotid artery (CCA), the left VA originated from the aortic arch as the second branch and both of the carotid arteries originated from the aortic arch as a common trunk also known as truncus bicaroticus (Figure 1, 2).

In addition, the right VA enters the transvers foramen of the C6 vertebra normally but the left VA enters the transvers foramen of the C7 vertebra. No intracranial vascular or parenchymal anomaly was detected on the cerebral MR and MRA images.

## DISCUSSION

An aberrant RSCA, is commonly encountered anomaly of the aortic arch with an incidence of 0.5%. This variation is due to interruption of the fourth right aortic arch between the notches for the CCA and SA while the left fourth arch remains intact.<sup>1</sup>

Truncus bicaroticus, in which carotid arteries originate from a common truncus, possibly develops due to persistence of the septum intercaroticus that divides right and left third aortic arches. The prevalence of this anomaly is less than 0.2%.<sup>2</sup>



**Figure 1.** Magnetic resonance angiography image demonstrates the truncus bicaroticus (straight arrow), aberrant right subclavian artery (curved arrow) and left vertebral artery (wavy arrow) originating from the aortic arch. **Figure 2.** Magnetic resonance angiography image demonstrates right vertebral artery originating from the posterior side of right common carotid artery (arrow).

Embryologically, the origination of the left VA from the aortic arch and of the right VA from the right CCA can be explained by the persistence of the first or second dorsal intersegmental artery and persistence of the right sixth dorsal segmental artery, respectively.<sup>3</sup> The left VA anomaly was described between 2.4% to 5.8% in a large autopsy series. The anomalous origins of the right VA: directly from the aorta, from the common carotid artery, from the brachiocephalic artery and duplicated origin are rarer.<sup>4,5</sup>

In patients with 102 aberrant RSCA, Tsai et al. reported that 13.7% of the patients had right VAs originated from the right CCA, and 28.6% of this group also had left VAs originated from the aortic arch as the third branch.<sup>6</sup> Aside from these, in our case, left VA is the second branch of the aortic arch concomitant with truncus bicaroticus. To our knowledge, this is the first case in the literature. Anomalies of VAs are rarely symptomatic. Bernardi and Dettori suggested that anomalous origin of large aortic arch vessels can cause changes in cerebral hemodynamics.<sup>7</sup> Komiyama et al. was reported that increased incidence of arterial dissection with aberrant left VA.<sup>8</sup> The catheter angiography is gold standard for imaging. Nevertheless, currently, thanks to advanced MRA and multidetector computed tomography angiography (MDCTA) examinations, the anomalies of origin of aortic arch branches can be demonstrated optimally without intervention.

In conclusion, such abnormalities are incidental findings in endovascular and surgical procedures or at autopsies but prior to both diagnostic and interventional angiography and head and neck surgery to be aware of the anomaly may save time and ease procedures and also prevent the possible iatrogenic complications. For this reason, anomalies origin of supraaortic vessels should be taken into consideration.



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## REFERENCES

1. Kim YD, Yeo HT, Cho YD. Anomalous Variations of the Origin and Course of Vertebral Arteries in Patients with Retroesophageal Right Subclavian Artery. *J Korean Neurosurg Soc* 2009; 45: 297-299.
2. Gluncic V, Marusic A. Association of the truncus bicaroticus, common trunk of the left subclavian and vertebral arteries, and retroesophageal right subclavian artery. *Ann Anat* 2000; 182: 281-283.
3. Best IM, Bumpers HL. Anomalous origins of the right vertebral, subclavian, and common carotid arteries in a patient with four-vessel aortic arch. *Ann Vasc Surg* 2002; 16: 231-234
4. Lemke AJ, Benndorf G, Liebig T, Felix R. Anomalous origin of the right vertebral artery: review of the literature and case report of right vertebral artery origin distal to the left subclavian artery. *AJNR Am J Neuroradiol* 1999; 20: 1318-1321.
5. Albayram S, Gailloud P, Wasserman BA. Bilateral arch origin of the vertebral arteries. *AJNR Am J Neuroradiol* 2002; 23: 455-458.
6. Tsai IC, Tzeng WS, Lee T, et al. Vertebral and carotid artery anomalies in patients with aberrant right subclavian arteries. *Pediatr Radiol* 2007; 37: 1007-1012.
7. Bernardi L, Dettori P. Angiographic study of a rare anomalous origin of the vertebral artery. *Neuroradiology* 1975; 9: 43-47.
8. Komiyama M, Morikawa T, Nakajima H, et al. High incidence of arterial dissection associated with left vertebral artery of aortic origin. *Neurol Med Chir (Tokyo)* 2001; 41: 8-11.