

# Arteria Lusoria and Truncus Bicaroticus: A Unique Aortic Arch Anatomic Variation



Jonathan Nachtigall, DO, Eric Rosen, DO, Jon C. George, MD  
From the Division of Interventional Cardiology & Endovascular Medicine  
Deborah Heart and Lung Center, Browns Mills, New Jersey.

**ABSTRACT:** A 67-year-old female with history of prior cerebrovascular accidents and lower extremity claudication symptoms underwent aortic arch angiogram, selective carotid angiograms, and computed tomography imaging to define her anatomy. Angiography revealed a common ostium of bilateral common carotid arteries with a separate distal common origin of bilateral subclavian arteries. To our knowledge, this is the first patient reported to have this unique anatomic variant.

VASCULAR DISEASE MANAGEMENT 2013;10(7):E121-E123

## CASE REPORT

A 67-year-old female presented to the outpatient clinic for bilateral lower extremity Rutherford Class 3 claudication symptoms. Her past medical history included single-vessel coronary bypass 20 years prior (LIMA-LAD), New York Heart Association Class II congestive heart failure, type 2 diabetes, uncontrolled hypertension, dyslipidemia, and multiple cerebrovascular accidents (CVAs). She had experienced multiple CVAs in the previous 3 years affecting primarily the left side of her body. However, carotid ultrasound revealed no significant stenosis. Due to the extent of her symptoms and clinical sequelae, the decision was made to further delineate her carotid anatomy with aortic arch angiography and selective angiograms of bilateral carotid arteries.

Right common femoral arterial access was obtained with a 6-French sheath. Arch aortogram revealed a common ostium of bilateral common carotid arteries with a separate distal

common origin of bilateral subclavian arteries (Figure 1).

Selective angiogram of the right common carotid artery confirmed no significant disease in the common or internal carotid arteries. Selective angiogram of the left common carotid artery revealed mild ectatic changes of the left internal carotid artery with no significant stenotic disease, and 60% to 70% proximal stenosis of the left external carotid artery. Selective angiogram of the right brachiocephalic artery confirmed a separate ostium distal to the carotid arteries giving rise to the vertebral, internal mammary, and subclavian arteries. Selective angiogram of the left subclavian artery confirmed a common origin with the right brachiocephalic artery, giving rise to the left vertebral and internal mammary arteries.

The patient was discharged home upon completion of the procedure without any further interventions. A computed tomography angiogram (CTA) was also performed as an outpa-

tient that confirmed findings from the selective angiograms (Figure 2).

## DISCUSSION

Three main branches typically originate from the aortic arch: the right brachiocephalic artery (or innominate artery), which gives rise to the right subclavian and the right common carotid artery; the left common carotid artery; and the left subclavian artery. The three most common anatomical presentations are: normal as listed above (70%); a “bovine arch,” which displays a common origin of the right brachiocephalic and the left common carotid artery (15%); and a presentation in which the left common carotid artery has its origin from the brachiocephalic artery proper rather than from a common trunk (10%).<sup>1</sup>

The largest imaging study to date was performed by Berko et al in 2009. The study retrospectively reviewed 1,005 consecutive CTAs of the chest performed in adults.<sup>2</sup> Five studies were technically limited and excluded;



Figure 1. Arch aortogram revealing common origin of bilateral carotid arteries and a distal common origin of bilateral subclavian arteries.

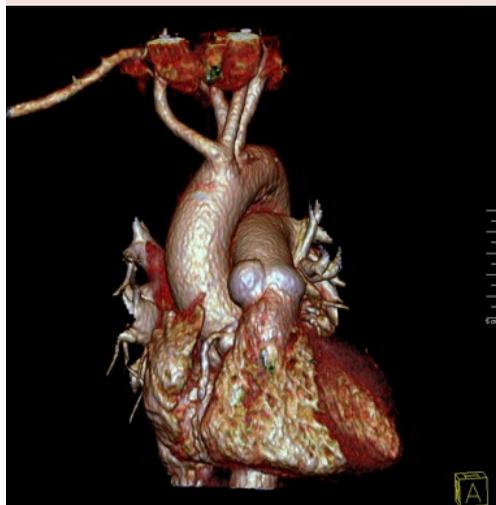


Figure 2. CT angiogram with 3D reconstruction demonstrating common origin of bilateral carotid arteries and a distal common origin of bilateral subclavian arteries.

65.9% of patients had normal aortic arch branching patterns; 32.4% of patients had variants in the branching pattern; and 1.5% of patients had anomalous branching patterns.<sup>2</sup> The bovine arch with a common origin of the right brachiocephalic and the left common carotid artery was present in 19.6% of patients. The left common carotid artery had its origin from the brachiocephalic artery proper (>1 cm from the origin of the brachiocephalic artery) in 7.8% of patients. The next largest

evaluated for aortic arch variations.<sup>3</sup> Liechty reported a variation, from proximal to distal, of a bicarotid trunk, left subclavian artery, and retroesophageal right subclavian artery in 10.7% of cases.

Arteria lusoria, an aberrant or anomalous right subclavian artery originating distal to the ostium of the carotid arteries, has an incidence that varies from 0.4% to 2%.<sup>4,5</sup> It is commonly associated with other congenital anomalies of the heart and great vessels resulting from embryologic malformation of the aortic arch, including truncus bicaroticus, which is a common trunk of bilateral common carotid arteries.<sup>5</sup> Klinkhamer reported that arteria lusoria was associated with truncus bicaroticus in 85 of 295 patients (29%) with aberrant right subclavian arteries.<sup>6</sup>

Truncus bicaroticus is a congenital variant that is asymptomatic, but arteria lusoria can be symptomatic due to esophageal compression by retroesophageal course of the right subclavian artery, resulting in dyspnea, stridor, dysphagia, and chest pain.<sup>5</sup> Klinkhamer stated that truncus bicaroticus is a precondition for tracheal-esophageal compression and development of clinical symptoms, because the truncus bicaroticus holds the trachea from the front and the arteria lusoria compresses the esophagus from behind.<sup>6</sup>

Herein, we present a unique and first reported case presentation of a truncus bicaroticus and arteria lusoria with common origin of bilateral subclavian arteries.

**Editor's Note:** Disclosure: The authors have completed and returned the

ICMJE Form for Disclosure of Potential Conflicts of Interest. The authors report no disclosures related to the content of this manuscript.

Manuscript received May 14, 2013; final version accepted June 10, 2013.

Address for correspondence: Jon C. George, MD, Director of Clinical Research, Division of Cardiovascular Medicine, Deborah Heart and Lung Center, 200 Trenton Road, Browns Mills, NJ, 08015, USA. Email: [jcgeorgemd@gmail.com](mailto:jcgeorgemd@gmail.com) ■

## REFERENCES

1. Layton KF, Kallmes DF, Cloft HJ, Lindell EP, Cox VS. Bovine aortic arch variant in humans: clarification of a common misnomer. *AJNR Am J Neuroradiol.* 2006;27(7):1541-1542.
2. Berko NS, Jain VR, Godelman A, Stein EG, Ghosh S, Haramati LB. Variants and anomalies of thoracic vasculature on computed tomographic angiography in adults. *J Comput Assist Tomogr.* 2009;33(4):523-528.
3. Liechty JD, Shields TW, Anson BJ. Variations pertaining to the aortic arches and their branches. *Q Bull Northwest Univ Med Sch.* 1957;31(2):136-143.
4. Kamiya H, Knobloch K, Lotz J, et al. Surgical treatment of aberrant right subclavian artery (arteria lusoria) aneurysm using three different methods. *Ann Thorac Surg.* 2006;82(1):187-190.
5. Saeed G, Ganster G, Friedel N. Arteria lusoria aneurysm with truncus bicaroticus: surgical resection without restoring blood supply to the right arm. *Tex Heart Inst J.* 2010;37(5):602-607.
6. Klinkhamer AC. Aberrant right subclavian artery. Clinical and roentgenologic aspects. *Am J Roentgenol Radium Ther Nucl Med.* 1966;97(2):438-446.

Copyright HMP Communications