Multiple variants of supra-aortic vessels

An asymptomatic 73-year-old woman was referred to our radiological department for CT angiography follow-up after aortic valve replacement.

CT angiography of the thoracic aorta showed normal placement of the aortic prosthetic valve. As an incidental finding, the following multiple development abnormalities of supra-aortic vessels were detected: 1) arteria lusoria, originating as the last branch of the aortic arch and coursing behind the oesophagus; 2) right vertebral artery arising from the right common carotid artery; 3) left vertebral artery stemming directly from the aortic arch.

Normal anatomy includes morphologies that are more common and others called variations which are less frequent but not considered abnormal. The embryologic development of the aorta occurs during the third week of gestation and starts with the formation of the endocardial tube. Each primitive aorta is formed by a ventral and a dorsal segment that are continuous through the first aortic arch. Subsequently, the two ventral aortae fuse to form the aortic sac, whereas the dorsal aortae fuse to form the midline descending aorta. Six paired aortic arches, which are called branchial arch arteries, develop between the ventral and dorsal aortae [1]. In addition, the dorsal aorta gives off several intersegmental arteries. Malformations of the aortic arch system can be explained by persistence of segments of the aortic arches that normally regress, or disappearance of segments that normally remain, or both.

The classical anatomy of supra-aortic vessels consists of three main branches departing from aortic arch, which are from right to left side the brachiocephalic artery, the left common carotid artery, and the left subclavian artery.

It is very important to understand vessels variants especially before interventional and surgical procedures, where a wrong assessment of the anatomy may lead to serious complications.

The right subclavian artery can be last branch of the aortic arch in 1% of individuals. It courses to the right behind the oesophagus in 80%, between the oesophagus and trachea in 15%, and anterior to the trachea in 5% [2]. A retrooesophageal course may be the cause of dysphagia lusoria, a term resulting from lusus naturae (Latin for “freak of nature”) [3]. The Adachi and Williams Classification recognizes four basic morphologies within this group (Fig. 3).

The vertebral artery is the largest and most constant branch of the subclavian artery, arising from the postero-
superior aspect of its proximal tract. More rarely, it may arise directly from the aortic arch. The most frequent location is between the left common carotid and subclavian arteries with a prevalence between 2.4 and 5.8%. The origin of the right vertebral artery from the right common carotid artery, in combination with a right subclavian artery originating distal to the left subclavian artery (artery lusoria), was documented in 10 case reports [4]. In our case report multiple variants of the supra-aortic vessels (which are not very rare as separate entities) occurred simultaneously.

**Differential Diagnosis List:** Subclavian and Vertebral Arteries anatomical variants., Dysphagia lusoria, Normal variants, Vascular rings

**Final Diagnosis:** Subclavian and Vertebral Arteries anatomical variants.

**References:**

Description: Axial CT Image shows the right vertebral artery arising from the right common carotid artery. Origin: Department of Diagnostic and Interventional Radiology, University Hospital of Pisa, Italy
Description: Axial CT image shows arteria lusoria passing behind the oesophagus. Origin: Department of Diagnostic and Interventional Radiology, University Hospital of Pisa, Italy
Figure 2

Description: Type CG represents our patient's right subclavian and left vertebral artery anomalies.

Origin: "Case Report Dysphagia Lusoria: A Case of an Aberrant Right Subclavian Artery and a Bicarotid Trunk" [3].
Description: Volume Rendering view shows the right vertebral artery originating from the right common carotid artery, left vertebral artery originating directly from the aortic arch, and arteria lusoria rising as the last branch of aortic arch. Origin: Department of Diagnostic and Interventional Radiology, University of Pisa, Italy
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