

Retroesophageal Right Subclavian Artery: A Case Report

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Abstract- Numerous variations of vessels arising from the aortic arch have been reported. One of the common anatomical variations in the right subclavian artery originating as the last branch of the aortic arch. This report demonstrates two cases of the retroesophageal right subclavian artery in an adult male and female. To highlight the significance of a retro esophageal right subclavian artery, especially its clinical and surgical implications. Multi-slice computed tomography (CT) of a case of an anomalous vessel. This report shows a retro esophageal subclavian artery originating as the last branch from the postero-lateral aspect of the thoracic aorta at the vertebral level T4. No abnormality was seen neither in the heart nor in no other vascular system in this region. Radiologists mainly encounter a retroesophageal right subclavian artery incidentally and are usually described as asymptomatic, but several clinical conditions have been associated with this kind of occurrence.

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Introduction

Normally, the aortic arch is divided into three main branches, the brachiocephalic trunk, the left common carotid artery, and the left subclavian artery (1). The subclavian artery is responsible for the blood supply of the upper limb and the part of the thoracic wall, neck, and brain. This artery originates from the brachiocephalic trunk on the right side and from the arch of the aorta on the left side; it passes on the anterior surface cervical pleura and onto the first rib and travels up laterally passing between anterior and middle scalene muscle (2). Examination of cadaver and clinical studies have revealed abnormalities in aortic artery divisions (1). These studies showed that the right subclavian artery has arisen from the fourth right aortic arch, a small portion of the right dorsal aorta, and the right seventh intersegmental artery (3). The first anomaly of the right subclavian artery was reported in 1735, and various abnormal cases reported subsequently (4,5). In the retroesophageal anomalies, the right subclavian

artery forms as the last branch of the aortic arch on the left and passes from the posterior of the esophagus to the right (6). This type of abnormalities is generally asymptomatic and can be the site of the formation of atherosclerotic plaque, aneurysm, or dysphagia lusoria needed surgery and treatment (7,8). An aberrant subclavian artery can also result in airway compression (9).

Case Report

The first case is a 77-year-old female patient referred to our clinic because she had difficulties in swallowing solid food followed by progressive vomiting and eventually leading to the reluctance of eating solid food. The family history showed no presence of atopy or feeding problems. All the laboratory tests, including Liver and renal function tests, complete blood count, erythrocyte sedimentation rate, electrolytes, urinalysis, and tuberculosis antibody tests, were all negative. Multi-slice computed tomography (CT) confirmed the

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diagnosis of aberrant right subclavian artery (ARSA) (Figure 1).

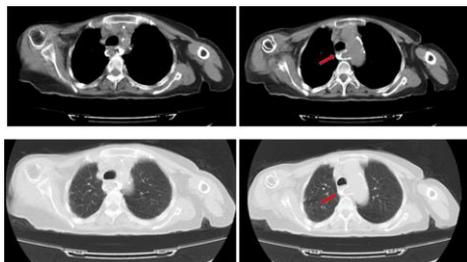


Figure 1. Axial without contrast computed tomography (CT) image exposed a retroesophageal subclavian artery

The second case is a 45-year-old male with a history of persistent pulmonary hypertension of the newborn (PPHN) and a c-AVSD. Due to progressive tachypnea, nasogastric tube feeding was required. After recovery from PPHN, feeding problems persisted, which consisted of swallowing difficulties and frequent vomiting. His physical exam was normal; He had some persistent coughs and was febrile with a temperature of 38°C and blood pressure 120/80. Chest examination showed diminished breath sounds in the left lower lung area and wheezing in the upper lung area without rhonchi. This patient had no history of smoking and alcohol, and his Purified Protein Derivative (PPD) and Human Immunodeficiency Virus (HIV) tests were negative. Because of the combination of persistent feeding problems (impaired swallowing and frequent vomiting despite adequate oral motor function), a CT-angiography was performed. (Figure 2).

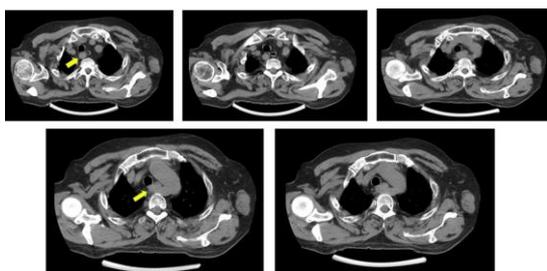


Figure 2. Axial without contrast-enhanced computed tomography (CT) image shown a retroesophageal subclavian artery.

In both patients, CT showed the variant vessel passed anterior-laterally to the right, Posterior to the esophagus and trachea, to the right axilla allowing it to be more accurately described as a retroesophageal right subclavian artery (Figure 3) (10). The right vertebral and internal thoracic arteries normally originate from this vessel. No other aortic arch or vascular variations were noted in this region. The aortic arch appeared of normal

length and width, located above the heart. Four branches originated from the aortic arch, namely from right to left; the right common carotid, the left common carotid, the left subclavian, and right subclavian arteries, respectively. The abdominal viscera were all normal.

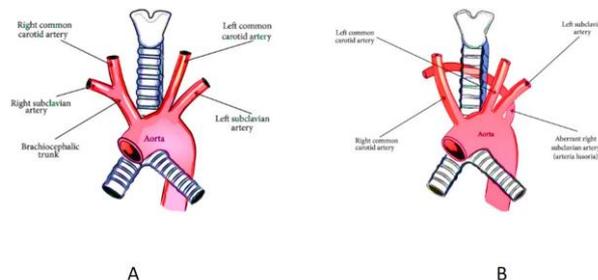


Figure 3. Schematic illustration of retroesophageal subclavian artery

Discussion

The right subclavian artery, which originates from the brachiocephalic artery, develops during the 4-5 week of gestation. During this time period, the aortic arches, associated with pharyngeal arches, are developed and terminated in the right and left dorsal aorta. The right subclavian artery arises from the fourth aortic arch in the normal development, part of the right dorsal aorta, and the seventh intersegmental artery (11). But if these origins change, the aberrant right subclavian artery will create.

Adachi-Williams classified anomalous branching pattern of the subclavian artery to four basic morphologic types: 1) type G: the right subclavian artery originates from the aortic arch as the last branch, 2) type CG: the anomalous of the right subclavian artery is type G, and the left vertebral artery originates from the aortic arch, 3) type H: the anomalous of the right subclavian artery is type G, and the two common carotids have a common trunk (carotid trunk), 4) type N: this anomalous is the opposite of the type G so that the left subclavian artery originates from the right aortic arch as the first branch (12). The course of aberrant right subclavian artery varies through the mediastinum; in cadaveric dissection has been revealed that most of them pass behind the esophagus (80%), and the rest of them pass between esophagus and trachea (15%) or front of the trachea (5%) (13).

Our present cases are type G and are named retropharyngeal right subclavian artery, which its distal part develops from the seventh intersegmental artery, and the proximal part develops from the right dorsal aorta (14). The first case of the retropharyngeal right subclavian artery was reported in 1735, which led to

Retroesophageal right subclavian artery

dysphagia (15). The occurrence of the retropharyngeal right subclavian artery was reported as 0.4% in the dissection room and 1.6% during autopsies (16). These anomalies are more prevalent in female and Down syndrome and are associated with Digeorge syndrome (17). The aberrant artery in a patient with congenital heart and arterial anomalies is more common than the general population (18,19).

The retropharyngeal right subclavian artery usually is asymptomatic (20). However, several clinical conditions may be associated with this condition. This artery may compress the esophagus and trachea, and as a result, cause dysphagia, stridor, or dyspnea, which are more common in children (16). Other symptoms can be asymmetric pulses and blood pressure in the upper limbs, trophic changes in the respective limb, and even acute ischemia of the right upper limb (16, 20). Awareness of such variations has a significant role during angiography and Doppler scanning of blood vessels (16,21-23).

Patients with retroesophageal subclavian artery represent a wide spectrum of abnormalities, including thoracic viscera and vessels. The retroesophageal subclavian artery is incidentally detected in many adult cases when the patients were being evaluated for other reasons. The exact diagnosis is also crucial for proper planning of surgical and interventional procedures and to avoid damages to vital structures. Appropriate imaging modalities like echocardiography, ultrasonography, CT, and MRI are required to detect diverse visceral and vascular abnormalities of the retroesophageal subclavian artery.

References

1. Adachi B. Das arteriensystem der Japaner. Kyoto: Verlag der Kaiserlich-Japanischen Universität zu Kyoto, 1928.
2. Mitchell J. Differences between left and right suboccipital and intracranial vertebral artery dimensions: an influence on blood flow to the hindbrain? *Physiother Res Int* 2004;9:85-95.
3. Larsen WJ, Sherman LS, Potter SS, Scott WJ. Human embryology. New York: Churchill Livingstone, 1993.
4. Roland CF, Cherry KJ. Symptomatic atherosclerotic stenotic disease of an aberrant right subclavian artery. *Ann Vasc Surg* 1991;5:196-8.
5. B. K. Verlagerung des Osophagus durch eine abnorm verlaufende Arteria subclavia dextra (Arteria lusoria). *Fortschr Geb Rontgenstr* 1936;54:590-5.
6. Ocaya A. Retroesophageal right subclavian artery: a case report and review of the literature. *Afr Health Sci* 2015;15:1034-7.
7. Fazan VPS, Ribeiro RA, Ribeiro JAS, Rodrigues Filho OA. Right retroesophageal subclavian artery. *Acta Cir Bras* 2003;18:54-6.
8. Brown DL CW, Edwards WH, Coltharp WH, WS S. Dysphagia lusoria: Aberrant right subclavian artery with a Kommerell's diverticulum. *Ann Vasc Surg* 1993;59:582-6.
9. Donnelly LF, Fleck RJ, Pacharn P, Ziegler MA, Fricke BL, Cotton RT. Aberrant subclavian arteries: cross-sectional imaging findings in infants and children referred for evaluation of extrinsic airway compression. *Am J Roentgenol* 2002;178:1269-74.
10. Polgaj M, Chrzanowski Ł, Kasprzak JD, Stefańczyk L, Topol M, Majos A. The aberrant right subclavian artery (arteria lusoria): the morphological and clinical aspects of one of the most important variations a systematic study of 141 reports. *ScientificWorldJournal* 2014;2014:292734.
11. Sadler TW. Langman's medical embryology. United States: Lippincott Williams & Wilkins, 2011.
12. Saito T, Tamatsukuri Y, Hitosugi T, Miyakawa K, Shimizu T, Oi Y, et al. Three cases of retroesophageal right subclavian artery. *J Nippon Med Sch* 2005;72:375-82.
13. Gomes MM, Bernatz PE, Forth RJ. Arteriosclerotic aneurysm of an aberrant right subclavian artery. *Dis Chest* 1968;54:549-52.
14. Hollinshead WH. Anatomy for Surgeons; Vol. I: The Head and Neck. United States: Harper and Row New York, 1968.
15. Williams G, Aff H, Schmeckeber M, Edmonds H, Graul E. Variations in the arrangement of the branches arising from the aortic arch in American whites and negroes. *Anat Rec* 1932;54:247-51.
16. Donadel MM, Lontra MB, Cavazzola LT, Corso CO. Retroesophageal right subclavian artery: a case report and a review of literature. *Eur J Anat* 2007;11:57.
17. Momma K, Matsuoka R, Takao A. Aortic arch anomalies associated with chromosome 22q11 deletion (CATCH 22). *Pediatr Cardiol* 1999;20:97-102.
18. Binet J, Longlois J. Aortic arch anomalies in children and infants. *J Thorac Cardiovasc Surg* 1977;73:248-52.
19. Nakajima Y, Nishibatake M, Ikeda K, Momma K, Takao A, Terai M. Abnormal development of fourth aortic arch derivatives in the pathogenesis of tetralogy of Fallot. *Pediatr Cardiol* 1990;11:69-71.
20. Boas N, Desmoucelle F, Bernadet V, Franceschi J-C. Rare cause of acute ischemia of the right upper extremity: thrombosis of a retroesophageal subclavian artery. *Ann Vasc Surg* 2002;16:387-90.
21. Kanaskar N, Vatsalaswamy P, Sonje P, Paranjape V.

Retroesophageal right subclavian artery. *Adv Anat* 2014;2014.

22. Farashah MSG, Shariati NH, Asghari R, Mohamadi S, Dolatkah MA, Shariati MBH. Pulmonary Sequestration: A Case Report. *Acta Med Iran* 2019;57:398-401.
23. Mohammadi S, Gholami Farashah MS, Asghari R, Rajabi F, Hesam Shariati N, Shariati H, et al. Case Report: Circumaortic Left Renal Vein. *Anat Sci J* 2017;14:179-82.