



An unusual variation of vertebral artery*

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Abstract

Vertebral artery is the first branch of subclavian artery which joins other sided vertebral artery to form basilar artery and becomes important source of blood supply to the brain.

The complex embryological development of vascular system often results in myriad of clinically relevant variations. Variation in the origin of right vertebral artery was found in 70-year-old female embalmed cadaver during routine dissection of neck in the department of anatomy. It was originating from right common carotid artery and its further course was as usual. Origin and course of left vertebral artery showed no variation.

Such type of variation is encountered very rarely. Awareness of such variations in origin is surgically important and clinically significant during diagnostic and interventional angiographic procedures.

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Key words [vertebral artery] [subclavian artery] [common carotid artery]

Introduction

Variations are part and parcel of Human Anatomy; and they are being creating interest in surgeons, radiologist, physicians and anatomists.

The vertebral artery normally arises from the posteroinferior aspect of the first part of the subclavian artery. The first part of the vertebral artery passes back and upwards between longus colli and scalenus anterior muscle, behind the common carotid artery and the vertebral vein. The second part ascends through the transverse foramina of all the cervical vertebrae except seventh [1].

Case Report

We noticed an unusual variation in a 70-year-old female embalmed cadaver in the Department of Anatomy during routine dissection of neck. The right vertebral artery exhibited variation in the origin. It originated from the right common carotid artery, then ascended upwards with usual course and entered transverse foramen of sixth cervical vertebra (Figure 1). On the left side, the origin and course of the vertebral artery was as usual. No other variations were found in neck structures and their relations.

Discussion

A variation in the origin and distribution of vertebral artery can cause alteration in cerebral hemodynamics that may predispose to aneurismal formation with a greater risk of cerebrovascular events [2, 3]. Occurrence and awareness of variations in origin of vertebral artery is not only surgically important, but also clinically significant from radiological point of view.

According to Schultz "Evolution will continue as long as variations occur" [4], and variations is a rule in anatomy.

De Garis [5] has reported that the vertebral artery is one of the most constant branches of subclavian artery. Stebbins [6] supported their comments by saying that unusual origin of vertebral artery is relatively rare. Iyer [7], in Indian population has reported that it is a rare presentation. Still large numbers of variations are documented in the origin of vertebral artery. Majority of the variations are in relation to left vertebral artery and its origin from arch of aorta; between left common carotid artery and left subclavian artery. The incidence of such origin from arch of aorta is 1.0 to 5.8% in different studies [8, 9].

Table 1 shows the different variations in the origin of vertebral arteries.

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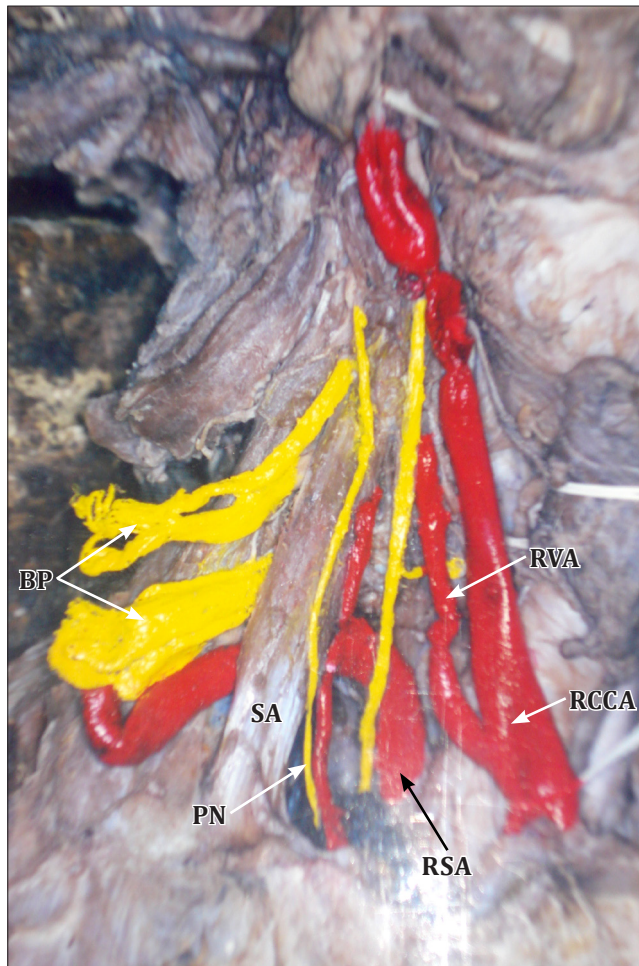


Figure 1. Photograph showing the variant right vertebral artery. (BP: brachial plexus; SA: scalenus anterior; PN: phrenic nerve; RCCA: right common carotid artery; RVA: right vertebral artery; RSA: right subclavian artery)

Nathan et al. [20] reported a left vertebral artery of aortic origin associated with the retro-oesophageal right subclavian artery, yet with normal origin of right vertebral artery. According to Hollinshead [21], the vertebral artery may arise lateral to or with the thyrocervical trunk instead of medial to it. He had quoted a case in which vertebral artery arose by two stems – one from brachiocephalic trunk & other from left subclavian artery. Nogueira et al. [22] had reported a dual origin of vertebral artery mimicking dissection on angiographic study.

According to Palmer [23] vertebral artery originates from common carotid artery only in 0.18% of cases, and according to Ligege [8] it is 0.28%. This unusual origin is often associated with the retro-oesophageal right subclavian artery. Similar observation was made by Vicko [24]. They have reported an unusual origin of both vertebral arteries – right one from right common carotid artery and left one from common trunk of it, and the left subclavian artery at the aortic arch, with the

retro-oesophageal right subclavian artery. The present case exhibits unusual origin of right vertebral artery without any associated variations in other structures.

The vertebral artery normally develops as follows: The vessel appears as a branch of dorsal division of the seventh cervical intersegmental artery. The post-costal anastomosis between the level of first and sixth cervical segments becomes enlarged to form the portion of the vertebral artery lying within the costo-transverse foramina of the cervical vertebrae. [25]. The

Table 1. Table shows the different variations in the origin of vertebral arteries.

Name of author	Origin of right vertebral artery	Origin of left vertebral artery
Satti [3]	Arch of aorta	2nd branch of subclavian artery
Iyer [7]	---	Dual origin: 1. Arch of aorta, 2. Left subclavian artery
Ligege [8]	Arch of aorta distal to left subclavian artery	---
Voster [9]	---	Arch of aorta (2 in 60 cases)
Himabindu [10]	---	Arch of aorta
Himabindu [10]	---	Dual origin: 1. Arch of aorta, 2. Left subclavian artery
Jayanthi [11]	---	Arch of aorta
Nasir [12]	Right common carotid artery	---
Kubikova [13]	---	Arch of aorta
Kim [14]	Right common carotid artery	Arch of aorta
Patasi [15]	---	Arch of aorta
Imre [16]	---	Arch of aorta
Panicker [17]	---	Arch of aorta
Matula [18]	External carotid artery	---
Park [19]	Right common carotid artery	---
Present Case	Right common carotid artery	---

possible embryological explanation for the present variation can be as follows: dorsal division of the seventh cervical intersegmental artery may not have formed, and may have been replaced by a branch from the right third aortic arch artery which forms common carotid artery.

The variation can have serious implication in neck surgeries. This anatomical characteristic of the variation needs attention during anterior cervical spine surgery, thyroid surgery or other interventions. During thyroidectomy, the inferior thyroid artery is usually ligated. It may be near to such unusual vertebral artery. Hence meticulous care may

be needed to avoid an inadvertent injury to the vertebral artery during thyroidectomy. During thyroid aspiration, the needle occasionally penetrates the posterior surface of the thyroid gland and it reaches the vertebral body. If the unusual vertebral artery is near to the thyroid gland, then there is a possibility to puncture it during thyroid aspiration. Therefore, knowledge of this variation of right vertebral artery may be helpful to avoid injury of it when performing these procedures. It is of great importance that the neuro-physicians be aware of such a possibility. Also for angiographic procedures such variation should be kept in mind.

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