Role of Anatomical Variation of Vertebral Artery in Clinical Practice

Kapil Amgain
Karnali Academy of Health Sciences (KAHS)
Nepal

Background

Existence of anatomical variations, especially in origin, course and branches of blood vessels create many difficulties for the anatomist as well as surgeons. Variation in the anatomical structures means the presence of flexibility morphology and topography of the body structures [1]. Almost all of the variations are due to embryological abnormality or persistence of normally obliterated structures and are totally benign and don’t leads to functional disability. However, some variation leads to mild to severe functional compromise and some embryological remainants may leads to development of carcinomas in the later stage of life [2]. Hence, the knowledge of the variation of the blood vessels and their abnormality in terms of their origin, course and branching pattern is very important for the surgeons, physicians and radiologist.

Variation in vertebral artery

The tremendous literatures have reported to the variations in the origin, course and branching pattern of the vertebral artery and its clinical significance is discussed correlating its ontogeny. The origin and course of the vertebral artery is unique in many aspects. It enters through the foramina transversalis of all cervical except the seventh cervical vertebrae, after arising from the subclavian artery. It then passes medially and behind the lateral mass of atlas vertebra, then after enters the skull via the foramen magnum. The two vertebral artery meet at the lower border of the pons and forms the basilar artery. It is infrequent if it passes through the bone at fifth, fourth, or seventh cervical transverse foramen [3]. In most of the case, the left vertebral artery arises from the arch of aorta and then entered the foramen transversarium of the 4th cervical vertebrae whereas the right vertebral artery arises from the right subclavian artery close to its origin and entered the foramen transversarium of the 5th cervical vertebra [4].

It is essential to know the variation of the entry of pre-vertebral part of vertebral artery to the foramen transversarium as serious complications may arise because of lack of knowledge of anatomy while doing angiography and surgical procedures. The knowledge of such variation in the vertebral artery is very important during the stenting of the carotid artery as well as vertebral artery, and various intracranial interventions [5]. The chances of complication during these procedures increases due to alteration of the

Citation: Kapil Amgain. “Role of Anatomical Variation of Vertebral Artery in Clinical Practice”. EC Clinical and Experimental Anatomy ECO.01 (2019): 27-29.
 rôle of anatomical variation of vertebral artery in clinical practice

**Citation:** Kapil Amgain. “Role of Anatomical Variation of Vertebral Artery in Clinical Practice”. EC Clinical and Experimental Anatomy ECO.01 (2019): 27–29.

cerebral hemodynamics which may causes the patient to intracranial aneurysms if we do not have the proper knowledge of the arterial variation [6].

**DISCUSSION**

Both diagnostic and interventional angiography can only be performed when there is an in depth understanding of normal or anomalous course of vertebral arteries. Before planning for these procedures, it is mandatory to identify the underling pathology including ostial lesions of the vertebral arteries or its abnormal course with the help of contrast enhanced MRA [1]. A more authentic understanding of the variability of the human body is now indispensable with the advancement in imaging techniques and surgery especially reconstructive minimally invasive procedures [5]. The abnormal variation of the vertebral arteries due to its maldevelopment is considered very rare in the literature [7].

Developmental anomalies and variations in the course, origin and branching pattern in blood vessels are very frequent. It is due to the complex process of angiogenesis and vasculogenesis during the embryogenetic period of fetal development [8]. The factors controlling the normal process of formation of blood vessels and its defects which leads to the occurrence of variation remain to be understand. It is believed that the genetic factors and different local hemodynamic factors influence the rate and direction of the blood flow and the blood pressure are involved in the formation of final pattern of vessels [9].

The vertebral artery originates on either side of the median plane, from the dorsal rami of dorsal intersegmental arteries. These dorsal rami undergo post-costal anastomosis longitudinally just posterior to the ribs [4]. All of these stalks of the vertebral artery then atrophy and disappear except the most caudal one, resulting the formation of the vertebral artery. The vertebral artery arises along with the subclavian artery from the seventh intersegmental artery. The seventh cervical intersegmental artery extends as the left subclavian artery [10]. The vertebral artery, after its origin enters the foramen transversarium of the 6th cervical vertebra in 90% cases and in remaining case it may enters the foramen transversarium of cervical vertebrae other than the sixth [4]. The size of the vertebral arteries are not equal in more than half of the case, the left being larger than the right [3,5].

Hence, it is very important to find out the course and origin of the vertebral artery and associated great vessels before the conducting angiography [11]. The repair of aneurysms, excisions of the masses in the craniocervical junction, vertebral end-arterectomy, vertebral artery bypass, and bony decompression of the vertebral artery requires the surgical interventions of the vertebral artery and the catastrophic sequelae during the surgical procedures like atlantoaxial transarticular screw fixation, anterior cordectomy are due to the lack of the knowledge of the normal and abnormal variation of vertebral artery in most of the cases. So, to prevent the complication, and wrong radiological interpretation, and to improve the outcome of any surgical procedure in the region of skull as well as head and neck, we should have a sound knowledge of the variations of the vertebral as well as other great vessels [12].

**CONCLUSION**

With the advancement in the technologies our knowledge regarding various variations in our body has been increased and an awareness regarding them can help reduce unnecessary complications during various interventions. Understanding the normal course and their variations is very important for both the endovascular interventionist and the diagnostic radiologist.

**BIBLIOGRAPHY**


2. RA Bergman., et al. “Opus II: cardiovascular system vertebral artery variations”. In Illustrated Encyclopedia of Human Anatomic Variation, RA Bergman, AF Afifi and R Miyauchi, Eds.
Role of Anatomical Variation of Vertebral Artery in Clinical Practice


©All rights reserved by Kapil Amgain.

**Citation:** Kapil Amgain. “Role of Anatomical Variation of Vertebral Artery in Clinical Practice”. EC Clinical and Experimental Anatomy ECO.01 (2019): 27-29.