



Case Report

Variation in the Course of Vertebral Artery: A Case Report

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ABSTRACT

The study demonstrate a case of a cadaver in which right vertebral artery had an unusual course. It originates from the right subclavian artery and enters the foramen transversarium of the fourth cervical vertebra, while the left vertebral artery had normal course. The morphometric measurements of the arteries were performed. Anatomic and morphological variations of the vertebral artery are of immense importance in surgery, angiography and all non-invasive procedures.

Key words: Variation, Vertebral artery, Foramen transversarium.

INTRODUCTION

The importance of vertebral artery in cerebral disorders clinically and surgically has been described earlier by Bernardi & Deton in 1975 and Vicko et al in 1999. [1,2] Literature reveals its importance in head and neck surgery, angiography and arterial dissection. [3]

The vertebral artery arises from the posterosuperior aspect of the first part of subclavian artery and is divided into four parts. The first part is from its origin to the foramen transversarium of the sixth cervical vertebra. Matula et al called this part of the vertebral artery as the pretransverse or prevertebral segment. [4] It runs upwards and backwards into the angle between the scalenus anterior and the longus colli muscle. Anteriorly are the common carotid

artery, inferior thyroid artery and the vertebral vein, whereas posteriorly are the transverse process of the seventh cervical vertebra, stellate ganglion, ventral rami of seventh and eighth cervical spinal nerves.

The second part of vertebral artery runs through the foramina transversaria of upper six cervical vertebrae. Its course is vertical upto the axis vertebra, from where it runs upwards and laterally to reach the foramina transversarium of the atlas vertebra. A venous plexus and a large branch from the stellate ganglion accompany this part of the artery. The ventral rami of second to sixth cervical spinal nerves lie posteriorly.

Third part of the vertebral artery lies in the suboccipital triangle. After emerging from the foramina transversarium of the

atlas, it runs dorsomedially on the superior aspect of the posterior arch of the atlas. It enters the vertebral canal by passing deep to the lower arched margin of the posterior atlantooccipital membrane.

The fourth part of the vertebral artery enters the posterior cranial fossa through the foramen magnum after piercing the dura and arachnoid mater. It then ascends anterior to the medulla oblongata, and at the lower pontine border it unites with its fellow of the opposite side to form the midline basilar artery. [5]

CASE REPORT

During the routine dissection course in the Department of Anatomy, University College of Medical Sciences, Delhi, an unusual course of the right vertebral artery was observed in a middle aged female cadaver. The artery was dissected and studied.

Left vertebral artery originated from the posterosuperior aspect of the first part of subclavian artery and traversed medially anterior to the scalenus anterior and longus colli muscle, behind the common carotid artery and was related posteriorly to the stellate ganglion and ventral rami of seventh and eighth cervical spinal nerves before it enters the foramen transversarium of the sixth cervical vertebra, the second, third and fourth part of the vertebral artery on this side was also normal.

The right vertebral artery originated from the posterosuperior aspect of the first part of the subclavian artery. This artery ascended behind the right common carotid artery and vertebral vein, and anterior to the upper, middle and lower brachial trunk, seventh, six and fifth cervical vertebrae and inferior cervical sympathetic ganglion, and finally entered the foramen transversarium of the fourth cervical vertebra. The second part of this vertebral artery, which normally extended from sixth to first cervical

vertebrae, was short and extended from fourth to first cervical vertebrae only (figure1). It was observed that from the foramen transversarium of axis to that of the atlas, the artery passed upwards and laterally and making a convex outwards loop probably allowing free movement of craniovertebral and intervertebral joint without any compression to the vertebral artery. The third and fourth parts of the artery on this side were normal.

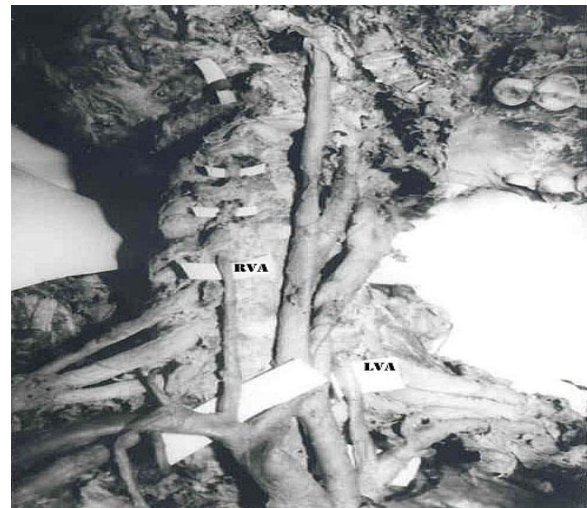


Figure 1. Photograph of the dissected neck region showing the entry of right sided vertebral artery (RVA) into the foramen transversarium of the fourth cervical vertebra. (LVA: left vertebral artery).

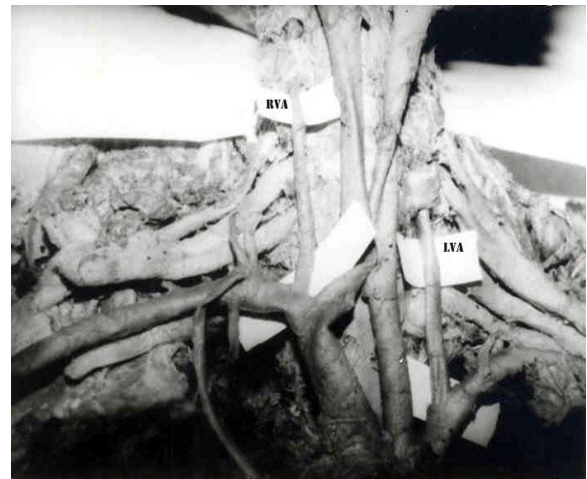


Figure 2. Photograph showing the reduction in the diameter of right sided vertebral artery (RVA) just before its entry into the foramen transversarium. (LVA: left vertebral artery).

The prevertebral segment of the right vertebral artery was 71.2mm, whereas on the left side it was 41.9mm. The diameter of left vertebral artery was measured to be 4.8mm from its origin to its entry into the foramen transversarium of sixth cervical vertebra, whereas on the right side it was found to be 4.6mm at the origin but reduced to 3.5mm just before its entry into the foramen transversarium of fourth cervical vertebra (figure 2).

DISCUSSION

Variations of the vertebral artery have been reported by many authors frequently occurring on one side and usually on the left. [3,6] Bernardi and Deton reported two cases in which right vertebral artery arise from the right common carotid artery. [1] Matula et al. studied 402 vertebral arteries and observed only one case in which right vertebral artery enters the foramen transversarium of fifth cervical vertebra. [4]

The present study demonstrates a variation of the right vertebral artery in a female cadaver. The vertebral artery was observed to be exposed from sixth to fourth cervical vertebrae on the right side after which it entered the foramen transversarium. Such an abnormal course of the vertebral artery can be explained on embryological basis. It is known that primitive dorsal aortae give off somatic intersegmental arteries that divide into ventral and dorsal branches. The formation of pre and post costal longitudinal anastomosis in the neck region interconnects the branches of intersegmental arteries. The first part of the vertebral artery is formed by dorsal division of seventh cervical intersegmental artery, and the second part from the post-costal anastomosis between sixth and first cervical intersegmental arteries and the precostal segment disappears. Third part is derived from the spinal branch of first cervical intersegmental artery. In the present case

probably there is persistence of the precostal anastomosis between seventh to fourth intersegmental arteries, which normally disappears instead of the post-costal anastomosis resulting in the exposed portion of the vertebral artery on the right side. This exposed part becomes vulnerable to compression, damage or distortion by external factors or during extreme rotatory movement of the neck, thereby compromising on its blood flow. Vertebrobasilar ischaemia from compression of the vertebral artery can occur under such circumstances.

The prevertebral course of the vertebral artery is extremely important, because it is most frequently affected with atherosclerosis and also because it causes cerebral disorders by altering the cerebral haemodynamics. [2,1]

Anatomical variations of the vertebral artery are of immense importance in angiography, surgery and most non-invasive procedures. [4] Vertebrobasilar ischemic strokes following rotational head movements have been reported in the literature. [7] It can take place during chiropractic manipulation, head hyperextension while engaged in ceiling painting, after a simple fall, or spontaneous head turning. [8-11] Chiropractors believe that predisposing lesions in patients leads to stroke during neck manipulation. [12] The pathogenesis of ischaemia is unclear, but can be contributed to arterial spasm induced by stretching of the vertebral artery in the foramen transversarium of the vertebrae. [13] The other known symptoms – syncope, vertigo and disturbances of vision can occur due to intermittent obstruction of the vertebral artery. [14]

CONCLUSION

Thus the present study suggest, that it is important to be aware of such variation in the vertebral artery as it might leads to

serious implication in surgery and angiographic procedures or can cause intermittent ischaemia and subsequent neurological complications.

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