

Case Report

**ABSENT INTRACRANIAL PART OF RIGHT VERTEBRAL ARTERY – A CASE REPORT**

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**ABSTRACT**

Hypoplasia or Absence of intracranial part of vertebral artery is a rare congenital anomaly. During routine dissection in the department of Anatomy, PSG IMS &R, Coimbatore, absence of right intracranial part of Vertebral artery was observed. In this study, Embryological explanation and clinical significance of absent Vertebral artery was explained.

**Key words:** Absent Vertebral artery, Posterior inferior cerebellar artery, Longitudinal neural arch artery, Trigeminal artery, Hypoglossal artery.

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**INTRODUCTION**

Vertebral artery arises from the upper surface of first part of subclavian artery. The artery passes upward through the foramina transversaria of upper six cervical vertebrae, winds round the lateral mass of atlas, enters the cranial cavity through the foramen magnum. At the pontomedullary junction, it unites with the similar artery of opposite side to form Basilar artery. Each vertebral artery is subdivided into four parts. First part extends upwards and backwards from its origin from Subclavian artery to the foramen transversarium of C6 vertebrae. Second part extends from the foramen transversarium of C6 to C1 vertebrae and is surrounded by a plexus of sympathetic nerves and Vertebral veins. Third part extends after emerging from foramen transversarium of atlas and it winds backwards around the lateral mass of atlas and appears in the suboccipital triangle and finally enters the vertebral canal below the lower arched border of the posterior atlanto occipital membrane and is continued as fourth part of vertebral artery. The fourth part of vertebral artery pierces the dura and arachnoid maters and passes through the foramen magnum. At the lower border of pons, it meets with the fellow of opposite side and forms the Basilar artery.

Hypoplasia or absence of vertebral artery can be explained by its peculiar development. According to Padget & Pearse moore[1], the development of vertebral artery is as follows 1. The post costal anastomosis between the levels of the first & 6<sup>th</sup> cervical segments becomes enlarged to form the portion of Vertebral artery lying within the costo – transverse foramina of the cervical vertebrae. This vessel

appear as a branch of 7<sup>th</sup> cervical intersegmental artery. 2. The portion of vertebral artery lying on the arch of atlas which is an 1<sup>st</sup> cervical intersegmental artery which fuses with the opposite side to form the Basilar artery. 3. Initially blood flow to Vertebral artery (Longitudinal neural arch ) is from the Internal carotid artery. 4. Later, from the internal carotid artery, Primitive arteries like primitive otic, primitive trigeminal, primitive hypoglossal and proatlantal arteries develop, which connect Internal carotid artery & Longitudinal neural arch arteries. 5. Anterior cerebellar artery & Posterior communicating artery develop from cranial & caudal divisions of internal carotid artery. 6. During the same time the Primitive arteries begin to regress. 7. Blood flow of the vertebral artery is taken over by the anastomosis. 8. If primitive arteries being persistent, hypoplasia or aplasia of Vertebral artery may occur along with or without large Posterior communicating artery to compensate for the posterior circulation.

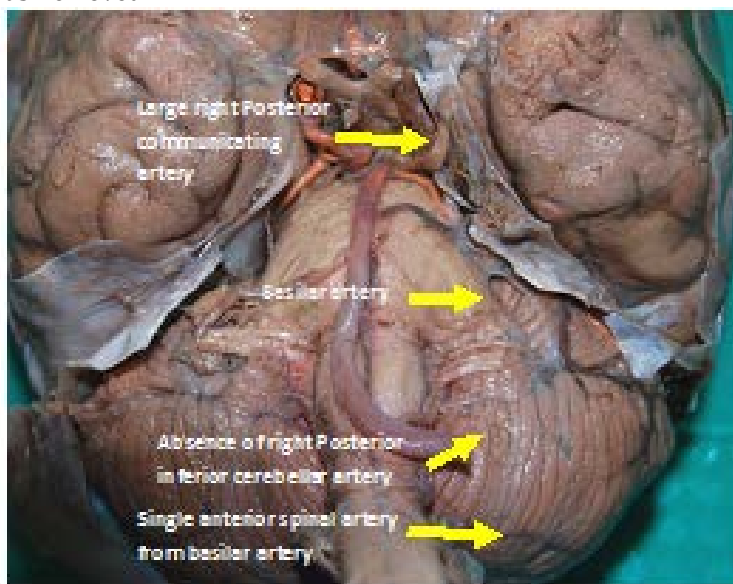
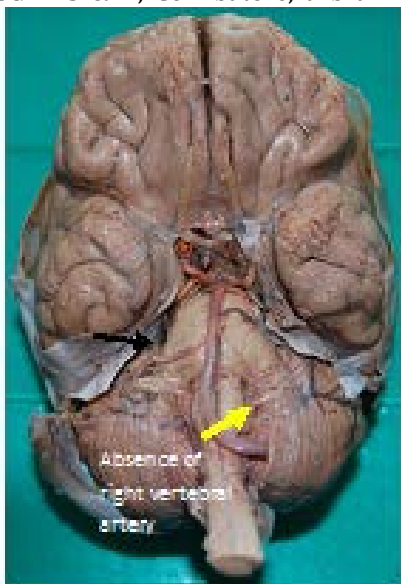
Hypoplasia or Absence of intracranial part of vertebral artery is a rare congenital anomaly. According to Tuncer, M.C. Akgul [2] et. al incidence of congenital atresia/hypoplasia of right vertebral artery is 1.8% and left vertebral artery is 3.1%. The intracranial part gives off lateral and medial branches. The branches are Anterior and posterior spinal arteries, Posterior inferior cerebellar arteries and medullary branches. Since it supplies large area of the brain & spinal cord its variations are clinically significant for the Radiologists and neurosurgeons. In case of absence / hypoplasia of vertebral artery, persistence of Primitive

arteries should be looked for. Persistent arteries may alter the surgical, endovascular procedures.

### CASE REPORT

During routine dissection in the department of Anatomy, PSG IMS & R, Coimbatore, a brain was removed

from the cranial cavity. A detailed study of arteries on the external surface of brain was done and absence of intracranial part of right vertebral artery was observed in that brain.



Absence of intracranial part of right vertebral artery, absence of right Posterior inferior cerebellar artery, a large right Posterior communicating artery & single anterior spinal artery from Basilar artery were observed on the right side of the brain.

### DISCUSSION

H. Takahashi, H. Tanaka et al [3] identified bilateral persistent hypoglossal arteries with absence of bilateral vertebral arteries found on MRI in a hypertensive patient.

Roberto Andres, Guerri - Guttenberg [4] identified a right persistent hypoglossal artery associated with hypoplasia of right and left vertebral arteries with absence of right posterior communicating artery in a cadaver.

Angelo Maurizio cleris, Giuseppe craparo et al [5] identified left persistent primitive hypoglossal artery with bilateral vertebral artery hypoplasia with small aneurysm of anterior communicating artery in 56 years old man presented with headache in CT angiogram.

Richard J. Woodcock, Harry J. Cleft [6] found type 1 proatlantal arteries with absence of vertebral artery in CT angiogram in 61 years old man suspected of left sided carotid bifurcation stenosis.

But in our study, we couldn't find any persistent primitive arteries in the absence of vertebral artery.

Eray Tuccar, Faith Yazaret al [7] encountered a thin left intracranial vertebral artery and unilateral (from left vertebral artery) origin of anterior spinal artery in a cadaver.

In our study, we found absence of right Vertebral artery with absence of right posterior inferior cerebellar artery with large right posterior communicating artery. To compensate the absence of Vertebral artery, Posterior communicating artery is large and provides posterior circulation. We could not identify any persistent primitive arteries in this cadaver as like in the above reported cases.

### CONCLUSION

If there is absence / hypoplasia of vertebral artery, persistence of Primitive arteries should be looked for

Absence of Vertebral artery and absence of Posterior inferior cerebellar artery are compensated by unusual large posterior communicating artery which provides posterior circulation.

Headache, Hypertension and Posterior circulation stroke may be the presenting feature in the absence/hypoplasia of vertebral artery.

Aneurysms, Atherosclerosis and Thrombosis are more common in persistent primitive arteries. Persistent primitive arteries may alter the surgical & endovascular procedures.

In setting of carotid bifurcation disease, vertebral arteries steal may occur because of preferential flow from vertebrobasilar system to carotid artery via persistent hypoglossal artery. Persistent hypoglossal artery may be associated with 12<sup>th</sup> nerve palsy, glossopharyngeal neuralgia and Moya-Moya disease (vertebral arteries in the brain are constricted in this condition).

Persistent Trigeminal artery produces Diplopia due to Abducent nerve irritation, Facial pain due to Trigeminal nerve irritation and Klippel-Feil syndrome (defect in the formation/segmentation of cervical spine with short neck).

Persistent Otic artery produces Facial and vestibulocochlear nerve compression.

Proatlantal artery produces Top of Basilar syndrome (thromboembolic occlusion of the top of the basilar artery produces rostral brainstem infarction) and Galen's vein aneurysmal malformation.

Knowledge of absence / hypoplasia of vertebral artery and its persistent primitive arteries are important for the Radiologists and Neurosurgeons.

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