

CASE REPORT

A RARE CASE OF PERSISTENT TRIGEMINAL ARTERY IN AN ADULT FEMALE WITH PARA POSTERIOR COMMUNICATING ARTERY ANEURYSM

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HOW TO CITE THIS ARTICLE:

Banavathu Daya Bharath Singh Naik, B. Hayagriva Rao, T. Sandeep, P. Krishna Rajiv. "A Rare Case of Persistent Trigeminal Artery in an Adult Female with Para Posterior Communicating Artery Aneurysm". *Journal of Evidence based Medicine and Healthcare*; Volume 2, Issue 21, May 25, 2015; Page: 3224-3227.

ABSTRACT: Anastomosis found in the adulthood between the carotid and vertebro-basilar systems, apart from the posterior communicating artery, are extremely infrequent and are due to the persistence of vessels that joined both systems during the fetal period. This carotid-vertebrobasilar anastomosis are the trigeminal, otic, and hypoglossal and proatlantal arteries. Persistent trigeminal artery is the commonest of the above mentioned four arteries. The reported incidence is about 0.2%. Patients may be asymptomatic or present symptoms due to low flow of posterior circulation or carotid microembolization from posterior circulation. PTA can cause trigeminal neuralgia. We report in this paper a case of a persistent trigeminal artery found in an adult female with a para pcom aneurysm who had persistent trigeminal artery which was seen in CT angiogram.

KEYWORDS: Persistent, Trigeminal artery, Intracranial aneurysm.

KEYMESSAGES: Persistent trigeminal represents one of the persistent fetal arteries in cerebral circulation which communicate between internal carotid and vertebro basilar circulation. While pcom artery is the main communicating artery that persists in an adult, persistent trigeminal artery is seen in a few cases.

INTRODUCTION: The human brain is supplied by 2 pairs of arteries. The internal carotid artery and its branches supplying the brain form the anterior circulation and the pair of vertebral arteries joining to form the basilar artery and its branches for the posterior circulation. The connection between the two systems is through the posterior communicating artery on both left and right side. There are other communications between the anterior and posterior circulation in the fetus. They are the trigeminal, otic, hypoglossal and proatlantal arteries. Rarely do they persist into adult life. The most common type among them seen sometimes in adults is the persistent trigeminal artery.

It arises for the carotid artery, mostly from the cavernous segment and reaches the basilar artery in two ways: in 50% of cases, it penetrates the sellaturcica, runs in its own groove and perforates the dura near the clivus to then join the basilar artery between the anterior inferior cerebellar arteries and the superior cerebellar arteries.

In most cases it is an incidental finding, but may be associated with malformations, aneurysms, trigeminal neuralgia or anomalies in cerebral angiograms.

CASE HISTORY: A 63 years old female presented with ptosis of eye of 1 week duration. She did not have any other symptoms. She was not a hypertensive or diabetic. Neurological examination

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was normal except for complete ophthalmoplegia and ptosis in the right eye. Plain CT brain was suggestive of an aneurysm in the pcom region. A CT angiogram was done and it revealed a para pcom aneurysm. It also suggested an abnormal communication between internal carotid artery and basilar artery. Four vessel digital subtraction angiogram was confirmative for the aneurysm and the abnormal communication was diagnosed as persistent trigeminal artery.[Image1]. Moreover, it also revealed a hypoplastic right PCoM and hypoplastic proximal vertebrobasilar segment with persistent primitive trigeminal artery. The aneurysm was causing compression over the third cranial nerve causing its palsy.

The patient was operated a right pterional craniotomy was done and through transsylvian approach the para pcom aneurysm was clipped and the pressure on the oculomotor nerve was relieved. The patient was followed up and the ptosis improved over 2 weeks in the post-operative period.

DISCUSSION: During the intracranial vascular development in the embryo (approximately 35 days of gestational age), four main temporally anastomosis arise between carotid and vertebral-basilar systems: the trigeminal, otic, hypoglossal and proatlantal inter segmental. These anastomosis persist for about 1 week and disappear with the subsequent development of posterior communicants and vertebral arteries. Occasionally, they persist after birth and adulthood, and the trigeminal artery is the most common representing about 85% of these primitive persistent anastomosis.¹

It originates from the cavernous portion of the internal carotid artery in the posterior knee and may course parasellar or intrasellar downward to join with the upper third of basilar artery.¹

The trigeminal artery (TA) is the most cephalic and anterior of these arteries, its name comes from its proximity to the trigeminal ganglion.¹ The reported incidence is about 0.2%.^{2,3}

It is classified by Saltzman in type 1, when it joins the basilar artery between the superior cerebellar arteries and the anterior inferior cerebellar arteries.⁴ The basilar artery proximal to the junction is usually hypoplastic and the posterior communicating arteries are absent or poorly opacified. The trigeminal artery supplies both posterior cerebral arteries and superior cerebellar arteries. The Saltzman type 2 it also joins the basilar artery between the superior cerebellar arteries and the anterior inferior cerebellar arteries but the posterior communicating arteries are present and supply the posterior cerebral arteries. Saltzman type 3 is referred to the trigeminal artery variant when it directly joins to a cerebellar artery. The persistent trigeminal artery we encountered was of Saltzman type 1.

The PTA is generally described as an incidental finding and is associated with various vascular anomalies, such as aneurysms of the circle of Willis, agenesis of the carotid and vertebral arteries, facial hemangiomas, posterior communicating artery disease, moyamoya, abnormalities of the vessels of the aortic arc, carotid-cavernous fistulas, arterial-venous malformations, brain tumors, cerebellar ischemia and trigeminal neuralgia.⁵ The PTA is easily identified by MR angiography.⁶ Patients with PTA associated with vascular malformation, cerebral aneurysm or trigeminal neuralgia may need surgical treatment.⁷ Therefore, the relationship of these vessels with the skull base must be well characterized, and CT angiography is a good method for simultaneous visualization of bone and vascular structures.⁶

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Recognizing these vessels before endovascular procedures is of great importance in accessing the risk of emboli passing through these vessels during embolization therapies. As the blood flows from carotid to the vertebro-basilar system, there is the risk of cerebellum and brainstem ischemia by emboli from an ulcerated plaque in the carotid bifurcation. It is also essential that these vessels are not improperly handled during surgical procedures in the posterior fossa, preventing hemorrhage and ischemia.

In conclusion, persistent trigeminal artery is a rare presentation connecting the anterior and posterior cerebral circulation. Though it is rare, it is not clinically insignificant. Various anomalies requiring surgery may be associated with it. Aneurysms of PTA has also been described which were managed with surgery and also endovascular coiling. The neurosurgeon, interventional radiologist or interventional neurologist should be aware of this important type of a anomaly to prevent inadvertent clipping, coiling of the vessel stem to prevent disastrous complications.

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FIGURE 1

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Date of Submission: 11/05/2015.
Date of Peer Review: 12/05/2015.
Date of Acceptance: 20/05/2015.
Date of Publishing: 25/05/2015.