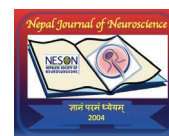


Persistent Primitive Trigeminal Artery-A Rare Vessel

Uddalok Das¹ , Narayan Pandit² ^{1,2}Department of Radiodiagnosis, North Bengal Medical College, Sushruta Nagar, Darjeeling, IndiaDate of submission: 24th October 2022Date of acceptance: 18th January 2023Date of publication: 30th January 2023

Abstract

Primitive carotido vertebral anastomosis is a well-recognized entity. During intrauterine development, craniovertebral blood circulation is characterized by temporary connections between the primitive internal carotid and dorsal longitudinal neural arteries. With normal development, they regress in the prenatal period. The most common of these is a persistent primitive trigeminal artery (PPTA). We report the case of a young male patient with intracranial bleed in the left capsuloganglionic region who was subsequently found to have a persistent primitive trigeminal artery on Magnetic Resonance Imaging Angiography.

Key words: Embryonic vessel, Persistent primitive trigeminal artery, MRI

Introduction

Persistent primitive trigeminal artery (PPTA) is one of the four recognized fetal carotido vertebral anastomoses which abnormally persists in postnatal life. This rare entity is sometimes detected incidentally on angiograms done for other purposes. Its prevalence is around 0.1 to 0.2% of cases.¹ Saltzman classified PPTA into two depending on its supply type I and type II.² Originating most commonly from the cavernous segment of the internal carotid artery (ICA) it connects with the basilar artery. The connection is classified as medial or intra-sellar type when it courses inside the sella or lateral type when it courses outside the sella.³ Presentation of patients may be varied from asymptomatic to multiple cranial nerve palsies, vascular aneurysms, hemifacial

spasms, and trigeminal neuralgia. We present the case of a young adult male with intracranial hemorrhage (ICH) who was diagnosed to have a PPTA on Magnetic Resonance Imaging (MRI) angiography.

Case report

A 36 year old man was rushed into the emergency reception of North Bengal Medical College by his colleagues in a state of deep coma. The patient was allegedly recovered in this state from his apartment where he used to live alone. On examination, GCS was 3/15. The patient was having a blood pressure of 90/60 and his pulse was feeble with a rate of 135 per minute. Respiration was shallow and rapid. There was an upper motor neuron type of rigidity in all the limbs. Deep tendon reflexes were exaggerated and Babinsky signs positive bilaterally. Considering a suspicion of a cerebrovascular accident an MRI was ordered. MRI revealed acute hemorrhage in the left basal ganglionic region measuring 74mm X 46mm with intraventricular extension and midline shift of 8mm to right (Figure 1).

MRI 3D time of flight (TOF) angiography revealed an absent left vertebral artery. The proximal part of the basilar artery was hypoplastic. There was an abnormal vessel arising from the C4 segment of the ICA on right, communicating with the distal basilar artery and in turn, giving rise to both posterior cerebral arteries (PCA). Both PCAs were thin. The posterior communicating arteries (PCoM) were not visible bilaterally (Figure 2). MRI venography was unremarkable. A provisional diagnosis of a PPTA in a case of ICH was made. A digital subtraction angiography was being planned to study the intracranial vascular anatomy in greater detail but the patient expired shortly after the MRI scan.

Access this article online

Website: <https://www.nepjol.info/index.php/NJN>DOI: <https://doi.org/10.3126/njn.v19i4.49051>

HOW TO CITE

Das U, Pandit N. Persistent Primitive Trigeminal Artery – A Rare Vessel. NJNS. 2022;19(4):57-8.



Address for correspondence:

Dr. Uddalok Das
Doctors Quarter G4,
North Bengal Medical College
Sushruta Nagar
E-mail: rikdas05@gmail.com

Copyright © 2022 Nepalese Society of Neurosurgeons (NESON)

ISSN: 1813-1948 (Print), 1813-1956 (Online)



This work is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License.



Figure 1: T2 Weighted image showing a large intracranial bleed in the left capsule-ganglionic region with intraventricular extension and midline shift to the right

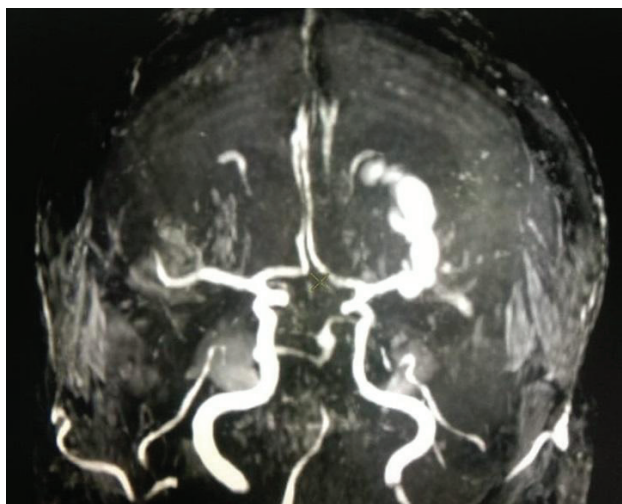


Figure 2: Hypoplastic proximal basilar artery. The distal basilar artery is supplied by an aberrant vessel arising from the right ICA. Both PCA are thin

Discussion

In fetal life the forebrain is supplied by the carotid system of arteries and the hindbrain is supplied by longitudinal neural arteries arising from the basilar artery. These longitudinal arteries are supplied by the carotid arteries via three pre-segmental arterial anastomoses, the trigeminal artery, the otic artery, the hypoglossal artery, and one intersegmental anastomosis, the proatlantal artery. With the formation of the PCom at the 6 mm embryo stage, the primitive anastomotic vessels regress with the trigeminal artery being the last one to regress.⁴ According to Salas et al, there are two distinct types of

PTA depending on how they relate to the abducent nerve: lateral or petrosal and medial or sphenoidal.⁵ The medial variant is more common amounting to around 60%.

Saltzman classified PPTA into two distinct types. In Saltzman type 1, the PPTA supplies the distal basilar artery, PComs are typically missing, and the proximal BA is hypoplastic. In Saltzman type 2, the PCAs are fed by patent PComs while the PTA fills the superior cerebellar arteries. A third type characterized by a PPTA joining a cerebellar artery directly is recognized by some authors as Saltzman type 3 which is however debatable.⁶ Sagittal angiography images show a “Neptune’s trident” configuration. Nearly one-quarter of all PPTAs have associated vascular abnormalities, such as saccular aneurysm, moyamoya, aortic coarctation, and arterial fenestrations.⁷

Conclusion

PPTA is a rare embryonic carotido vertebral anastomosis. Very often these abnormally persistent vessels may be responsible for a myriad of symptoms and sometimes cerebrovascular events. MRI angiography must be considered in all patients with ICH at atypical locations and especially occurring in young adults presenting with ICH. Neurosurgeons must be aware of this vascular entity especially the intrasellar variant which may be at risk of accidental injury during transsphenoidal procedures.

References

1. Osborn, Anne G., et al. *Osborn’s Brain: Imaging, Pathology, and Anatomy*. Second edition, Elsevier, 2018
2. Saltzman GF. Patient primitive trigeminal artery studied by cerebral angiography. *Acta Radiol*; 1959; 51:329-336
3. Kalmykov MIu, Ternovoï SK. The persistent trigeminal artery as evidenced by multislice spiral computed tomographic angiography. *Vestn Rentgenol Radiol* 2014;5:19-25. PMID: 25775891.
4. Luh GY, Dean BL, Tomsick TA, Wallace RC. The persistent fetal carotid-vertebrobasilar anastomoses. *AJR Am J Roentgenol*. 1999; 172: 1427–1432.
5. Salas E, Ziyal IM, Sekhar LN, Wright DC. Persistent trigeminal artery: an anatomic study. *Neurosurgery*. 1998; 43: 557–562.
6. Benoît Nolet, Rouillard-Bazinet N, Régis Olyr. Saltzman Type III Persistent Trigeminal Artery: A Case Report and Review of Medical Literature. *Indian J Neurol*. 2017;1(1): 101.
7. Cheng WC, Wang AD. Carotid-cavernous sinus fistula associated with a primitive trigeminal artery. *Neurosurgery*. 1990; 27: 802–805.