



PERSISTENT PRIMITIVE TRIGEMINAL ARTERY- A RARE EMBRYONIC CAROTID-BASILAR ANASTOMOSIS.

Radiology

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ABSTRACT

Introduction: There are few primitive arterial connections present between primitive carotid artery and primitive basilar artery which usually regresses and disappears except posterior communicating artery (PCoA) and if they fail to regress they are termed persistent carotid-basilar anastomosis (PCBA) which has 4 types- namely persistent trigeminal artery (PTA), persistent otic artery, persistent hypoglossal artery and proatlantal intersegmental artery.

Case Report: We reported the case of 54 year old male with chronic hypertension having complaint of acute onset of right sided hemianopia for which MRI imaging revealed thrombotic occlusion of left posterior cerebral artery with changes of subacute infarction in its territory and accidental finding of right sided persistent trigeminal artery (PTA) - type of persistent carotid-basilar anastomosis (PCBA).

Discussion: Persistent trigeminal artery (PTA) arises from junction between petrous and cavernous part of ICA and communicates with basilar artery and is most common type of persistent carotid-basilar anastomosis and is usually unilateral. There are two types of PTA noted according to Saltzman classification. Diagnosis of PTA is made on angiographic images which on sagittal sections show classical "Neptune's trident configuration" also known as "Tau sign".

KEYWORDS

Persistent carotid-basilar anastomosis (PCBA), Persistent trigeminal artery (PTA), Neptune's trident, Tau sign.

INTRODUCTION:

During embryonic development, there are few connections present between primitive carotid artery and two neural arteries (fetal precursor of basilar arteries)^[8].

All these primitive arterial connections regresses and disappears once definitive cerebral circulation forms except posterior communicating artery (PCoA) which forms part of circle of Willis, if they fail to regress they are called persistent ("primitive/embryonic") carotid-basilar anastomosis (PCBA)^[1].

There are 4 types of PCBA noted, each is named according to its anatomic relationship with specific cranial or spinal nerves, from superior to inferior they are called persistent trigeminal artery (PTA) (CN V), persistent otic artery (CN VIII), persistent hypoglossal artery (CN X) and proatlantal intersegmental artery (C1-3), among them persistent trigeminal artery is most common form^[2].

We incidentally reported case of right sided PTA in patient having subacute infarction in territories of left posterior cerebral artery (PCA).

CASE REPORT:

A 54 year old male patient with history of chronic hypertension came to radiology department of Gujarat Cancer and Research Institute Ahmedabad with complaint of acute onset of right sided hemianopia, general examination revealed no pathology or abnormalities and he underwent MRI brain with MR angiography study.

Imaging Findings Revealed:

Abnormal ill-defined altered signal intensity area involving cortical grey matter and subcortical white matter in the territory of left posterior cerebral artery in left occipital region, left medial temporal region and left forceps major which appears hypointense on T1w images (Image-2), hyperintense on T2w images, not suppressed on FLAIR images (Image-1), shows restriction on DWI images (Image-4) with corresponding hypointensity on ADC images (Image-5) and shows gyriform enhancement on T1w post contrast images (Image-3).

There was no e/o any areas of blooming noted on GRE images to suggest haemorrhagic transformation.

- Associated findings of multiple lacunar infarcts noted in bilateral corona radiata and cavum velum interpositum.
- On MR angiography study, there was non-visualization of all four segments of left posterior cerebral artery suggesting thrombotic occlusion of left posterior cerebral artery (Image-6 and 7) with changes of subacute infarction.

- On MR angiography study, abnormal vascular communication was noted between cavernous part of right internal carotid artery (ICA) and basilar artery with associated absent right posterior communicating artery (PCoA) (Image-8), hypoplastic right vertebral artery and caudal part of basilar artery.

On Sagittal reconstruction images, characteristic "Neptune's trident" or "Tau sign" demonstrated very well. (Image-9)

Above findings suggestive of Saltzman type 1 of persistent trigeminal artery.

IMAGES:

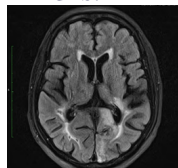


Image-1
FLAIR axial

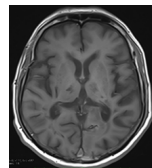


Image-2
T1w axial

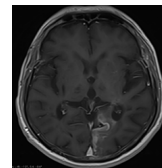


Image-3
T1w axial Post contrast

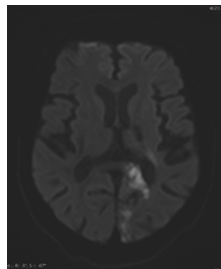


Image-4 DWI axial

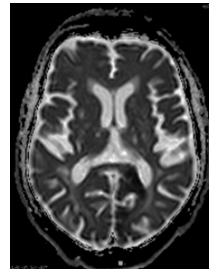


Image-5 ADC axial

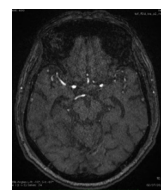


Image-6

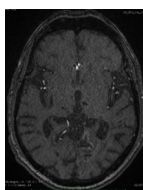


Image-7

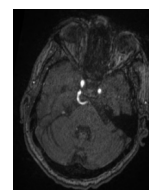


Image-8

MR Angiography axial MR Angiography axial MR Angiography axial

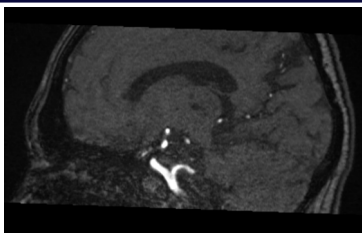


Image-9 MR Angiography coronal- showing “Neptune's trident” or “Tau sign”

DISCUSSION:

Persistent trigeminal artery (PTA) is most common form of PCBA with prevalence of 0.1 to 0.2 % of general population and is usually unilateral^[3,4].

PTA arises from junction between petrous and cavernous part of ICA and runs postero-laterally along trigeminal nerve (41%), or crosses over or through the dorsum sellae (59%) and communicates with basilar artery^[6,9].

There may be associated hypoplastic vertebral artery, posterior communicating artery or caudal basilar artery noted^[10].

There are two types of PTA noted according to Saltzman classification:

Type-1 PTA supplies the distal vertebra-basilar arteries with absence of PCoA and absent/hypoplastic ipsilateral vertebral artery and/or caudal part of basilar artery and Type-2 PTA which supplies superior cerebellar artery and ipsilateral PCA is supplied by PCoA^[5].

Diagnosis of PTA is made on angiographic images which on sagittal sections show classical “Neptune's trident configuration” also known as “Tau sign”^[7].

Nearly one fourth of all PTAs are associated with vascular abnormalities such as saccular aneurysm, moya-moya disease, aortic coarctation and arterial fenestration.

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