

Persistent Trigeminal Artery: A Little Known Cause of Trigeminal Neuralgia- MR Imaging

Wariss Adegbindin^{1*}, Moussa Coulibaly¹, Meriem Benzalim¹, Soumaya Alj¹¹Department of Radiology CHU Mohammed VI, Cadi Ayad University Marrakech MoroccoDOI: [10.36347/sjmcr.2023.v1i1i05.043](https://doi.org/10.36347/sjmcr.2023.v1i1i05.043)

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*Corresponding author: Wariss Adegbindin

Department of Radiology CHU Mohammed VI, Cadi Ayad University Marrakech Morocco

Abstract

Case Report

A persistent trigeminal artery (PTA) is a non-involuting embryonic vessel that connects the cavernous part of the internal carotid artery with the posterior circulation. In the adult, it is usually found incidentally but can be often associated with vascular malformation, cerebral aneurysm trigeminal neuralgia and even posterior circulation strokes. We report here a case of persistent trigeminal artery as a cause of trigeminal neuralgia and its aspects found in MR imaging.

Keywords: Trigeminal Artery, Neuralgia, strokes, MR imaging.

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INTRODUCTION

The trigeminal artery is a persistent communication between the internal carotid artery and the basilar artery (BA). It is the most common embryonic carotid-vertebral anastomosis and is one of the causes of compression of the trigeminal nerve responsible for trigeminal neuralgia. Here we report a case of trigeminal neuralgia caused by compression of the trigeminal artery.

CASE REPORT

This is a 57-year-old patient who has had right neuralgia for 3 months with progressive worsening. Clinical examination found right facial pain. A complete biological workup was strictly normal. Cerebral MRI angiography showed a persistent right trigeminal artery measuring 3.9 mm at the entrance to the cavernous sinus and 3.2 mm in its middle part. It connected the cavernous part of the internal carotid artery with the top of basilar artery which is hypoplastic. At the entrance to the cavernous sinus, this artery makes contact with the trigeminal nerve at the level of the proximal part of Meckel's cavum (Figures 1, 2, 3). The ipsilateral acoustic-facial bundle is without abnormality. Symptomatic medical treatment was instituted. As for the surgical treatment, the patient refused this therapy and was finally lost to follow-up.

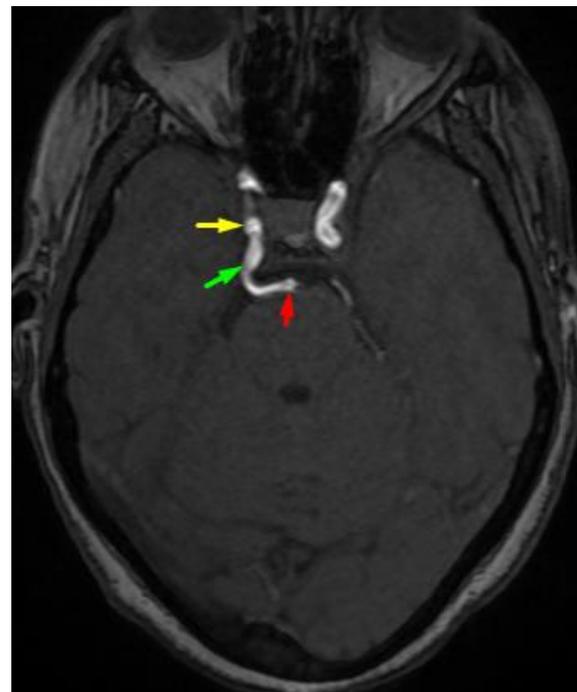


Figure 1: Magnetic resonance angiography 3D Time-of-flight in the axial plane technique on a 1,5 Tesla MR unit demonstrates an anomalous vessel (green arrow), the PTA, originating from the right cavernous ICA (yellow arrow) connected with the BA (red arrow)



Figure 2: MR Angiography coronal maximum intensity projection (MIP) in coronal plane showing typical PTA (red arrow) arising from cavernous ICA and connected with Basilar artery which is hypoplastic (green arrow)

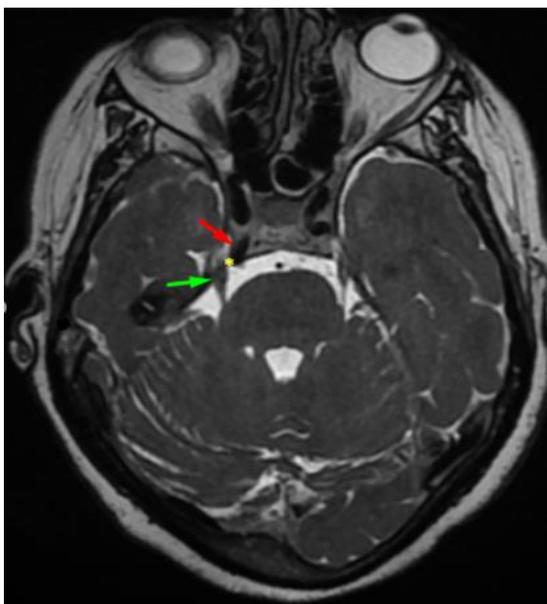


Figure 3: MR 3D T2 cube sequence in axial plane reveals a vascular loop of the PTA (red arrow) abutting (asterisk) the right trigeminal nerve (green arrow) at its entrance in meckel cavum

DISCUSSION

The primitive trigeminal artery (PTA) is the last artery to involute of the four major anastomoses which arise from the anastomosis between the carotid system and the vertebro-basilar system [1]. This major anastomose include the primitive trigeminal, the otic (acoustic), the hypoglossal, and the proatlantal intersegmental arteries [2].

The trigeminal artery is then the most common embryonic anastomoses persistent carotid-basilar a lot in adults. It represents 80 to 85% of carotid-basilar

anastomoses persistent [3]. This artery usually involutes after the development of the posterior communicating artery.

The exact causes of the persistence of this primitive vessel into adulthood are not completely clear. Several reported cases of PTA-induced trigeminal neuralgia used cerebral angiography for verification of the PTA [4]. In our case, we used MRA only because of its availability but also because we wanted to adequately explore the origin of this trigeminal neuralgia, while avoiding irradiating the patient.

Cerebral angiography has the role of which to show the vessels with precision without detecting its relationship with neighboring nervous structures. On the other side, MRA can fully confirm the vessel that induces TN, so patients who need surgical treatment may undergo an operation without being exposed to the risks of cerebral angiography [4].

There are 3 types of PTA described by saltzman. In Saltzman type 1, also called fetal PTA, the PTA insertion in the basilar artery is distal to the anterior inferior cerebellar artery (AICA) and proximal to the superior cerebellar artery (SCA) and, in some cases, the BA proximal to the insertion of the PTA may be hypoplastic and the posterior communicating artery (PcoA) of the same side may be absent. In the Saltzman type 2, there is usually no hypoplasia of the basilar artery, the posterior communicating artery (PTA) inserts proximally to the SCA, supplying them, and the PCAs are predominantly supplied by the PcoA. In the Saltzman type 3 variant, the PTA inserts directly into one of the cerebellar arteries, without having an anastomosis with the BA. In the case of Slatzman type 3 there are 3 variants: the type 3a variant that terminates in SCA ; the type 3b variant, and the most common one, that terminates into AICA ; and type 3c variant that terminates into posterior inferior cerebellar artery (PICA) [5].

In the study of 4.650 patients that underwent brain MRA, the prevalence of each type using the Saltzman classification was as follows: type I, 24%; type II, 16%; type III, 60% [6]. A variant of the persistent trigeminal artery in this case, is classified as Saltzman type I since it connects the cavernous part of the internal carotid artery with the the top of the basilar artery which is hypoplastic.

The persistent trigeminal artery often has no pathological impact. However, there may be intracranial aneurysms in 3% of patients with a persistent trigeminal artery. We did not find an intracranial aneurysm in our patient. Moreover, it can rarely be the cause of oculomotor paralysis and symptomatic trigeminal neuralgia because of its proximity to the abducens nerve[7] and the ophtalmic V [8]. In our case it is a

conflict with the trigeminal nerve at the level of Merkel's cavum.

Treatment can be either conservative with medication or surgical through microvascular decompression; the latter offering the most complete and long-lasting relief from trigeminal neuralgia. Another surgical option is gamma knife radiosurgery: a non-invasive stereotactic radiosurgical technique that utilizes a focused beam of radiation to target the root of the trigeminal nerve. This option may be preferred in elderly patients because of the lower complication rate [9]. We were unable to follow our patient who was unfortunately lost to follow-up after put under Symptomatic medical treatment.

CONCLUSION

Although rare and sometimes asymptomatic, knowledge and recognition of the persistence of the trigeminal artery is necessary in particular when it is the cause of trigeminal neuralgia for which surgical treatment may be considered.

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