



Hyperplastic Anterior Choroidal Artery—A Rare Variant Detected on MR Angiography

Ankita U. Shah¹ Anagha R. Joshi¹ Pareekshith R. Rai¹ Pratik Kapse¹

¹Department of Radiology, Lokmanya Tilak Municipal Medical College and General Hospital, Mumbai, Maharashtra, India

Address for correspondence Pareekshith R. Rai, MD, Department of Radiology, Lokmanya Tilak Municipal Medical College and General Hospital, Sion, Mumbai, Maharashtra 400022, India (e-mail: 1paree2@gmail.com).

Indian J Radiol Imaging 2022;32:266–269.

Abstract

Introduction The anterior choroidal artery is a branch of the terminal internal carotid artery (ICA) that is often an incidentally detected anomaly. The hyperplastic variant has been linked with an increased risk of aneurysms. We explore the role of magnetic resonance (MR) angiography in the detection of this variant and its impact of presentation of patients.

Patient Presentation A 62-year-old diabetic and hypertensive male came to the casualty with complaints of giddiness, left-sided weakness, and loss of coordination for the last 2 to 3 days. He was provisionally diagnosed with a posterior circulation stroke.

Management and Outcome Magnetic resonance imaging of brain revealed an acute infarct in the right thalamus and the midbrain. Time-of-flight angiography sequences were done that showed hypoplasia of the A1 segment of the left anterior cerebral artery, fetal origin of the right posterior cerebral artery, narrowing of the left ICA, and a hyperplastic left anterior choroidal artery. He was managed conservatively with antiplatelets. He later underwent a digital subtraction angiography that revealed significant narrowing of the left ICA for which he was advised carotid stenting. However, the patient was unwilling for the procedure and was discharged on oral medication with stable vitals.

Conclusion Anatomical variations in the intracranial vasculature impact ischemia territory and the approach to intracranial pathology. Hyperplastic anterior choroidal artery results from the abnormal persistence of fetal pattern of vascular supply. It is important to recognize the presence of a hyperplastic anterior choroidal artery as it impacts both disease presentation and management of these patients. MR angiography allows for noninvasive and reliable detection of these anomalies in patients without the risks associated with radiation or contrast exposure in conventional/computed tomography angiography.

Keywords

- ▶ anatomical variations
- ▶ hyperplastic anterior choroidal artery
- ▶ MR angiography

Introduction

The anterior choroidal artery is a branch of the terminal internal carotid artery (ICA) that courses normally between

the uncus and the midbrain and terminates in the ipsilateral choroid plexus. It thus has two segments: a cisternal segment and an intraventricular segment. A hyperplastic

published online
June 9, 2022

DOI <https://doi.org/10.1055/s-0042-1744231>.
ISSN 0971-3026.

© 2022. Indian Radiological Association. All rights reserved.
This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)
Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

anterior choroidal artery is often an incidentally detected anomaly which may resemble the posterior cerebral artery (PCA) in course and caliber and is sometimes mistaken for a double PCA.^{1,2} We present the case of a 62-year-old male patient who was incidentally detected to have this anomaly on magnetic resonance (MR) angiography.

Patient Presentation

A 62-year-old male came to the casualty with complaints of giddiness, left-sided weakness, and loss of coordination for the last 2 to 3 days. He was a known diabetic and hypertensive on medication. His past history was significant for the occurrence of carcinoma of the buccal mucosa for which he had undergone radical surgery followed by chemotherapy and radiotherapy. He was provisionally diagnosed as a case of posterior circulation stroke.

Ethical Considerations

The details regarding the patient and the relevant images were obtained retrospectively and no active intervention was done. Patient consent for publication was obtained.

Management and Outcome

An emergency computed tomography (CT) cerebral angiography failed to detect acute ischemia/infarction but showed significant narrowing of the left ICA. Later a magnetic resonance imaging brain was done that revealed an acute infarct in the right thalamus and the midbrain, a chronic infarct in the left frontal lobe, chronic ischemic changes, and age-related

atrophy. Time-of-flight angiography sequences were done that showed hypoplasia of the A1 segment of the left anterior cerebral artery (ACA), fetal origin of the right PCA, and a prominent artery coursing almost parallel to the left PCA, which appeared to arise from the left supraclinoid ICA, that is, a hyperplastic anterior choroidal artery (►Figs. 1,2,3) and narrowing of the left ICA (►Fig. 4). He was managed

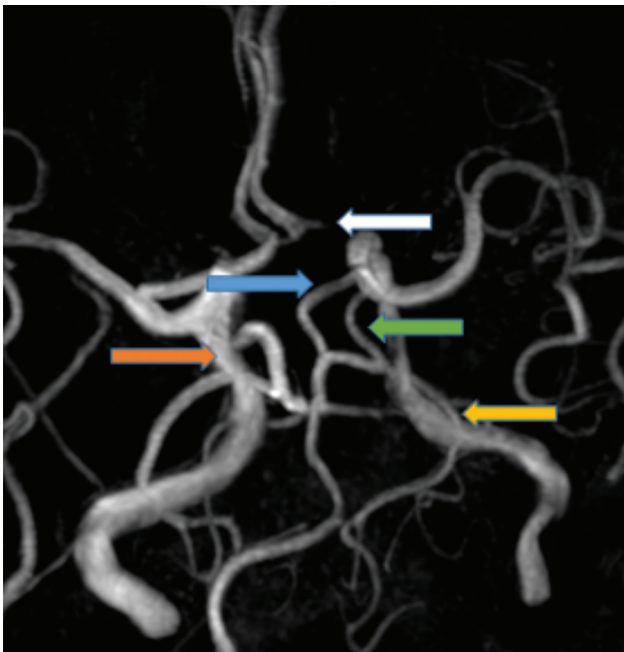


Fig. 1 Three-dimensional reconstructed time-of-flight images demonstrate a hypoplastic A1 segment of the left anterior communicating artery (white arrow). A normal left posterior communicating artery is noted (blue arrow). Hyperplastic anterior choroidal artery (green arrow) is seen coursing along the P1 and P2 segments of the left posterior cerebral artery (yellow arrow). Fetal origin of the left posterior cerebral artery is noted (orange arrow).

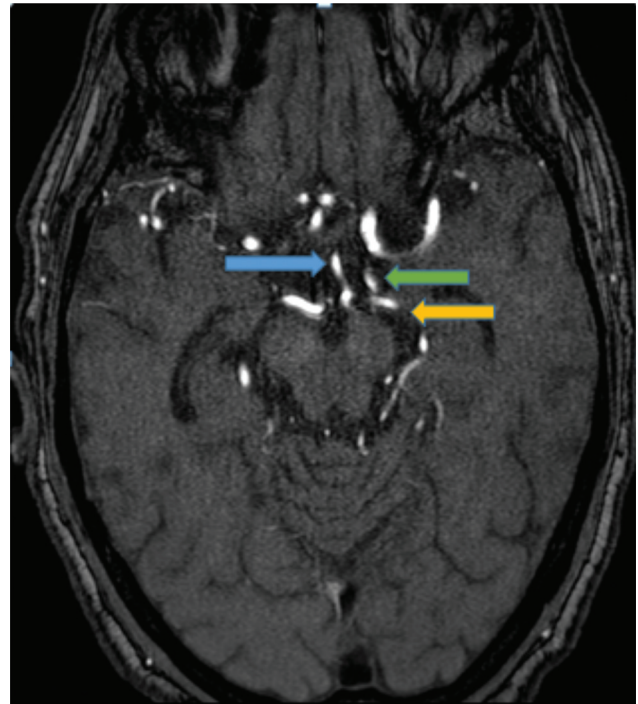


Fig. 2 Time-of-flight angiography images demonstrate a normal posterior communicating artery (blue arrow). The anterior choroidal artery (green arrow) is seen to course almost parallel to the posterior communicating artery and the proximal posterior cerebral artery (yellow arrow).

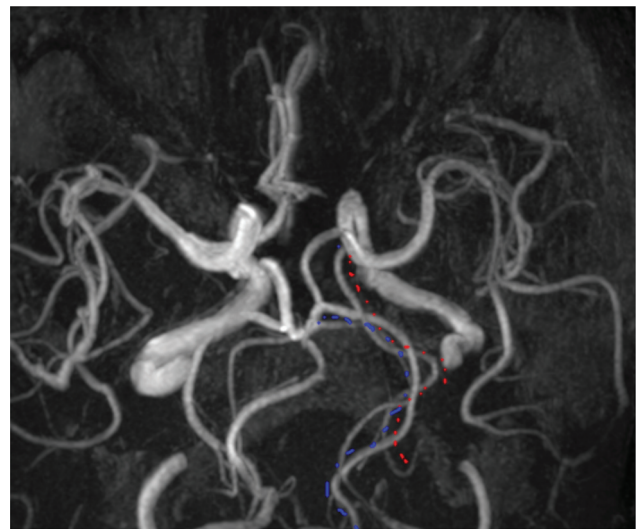


Fig. 3 Three-dimensional magnetic resonance angiography reconstruction: The blue and red dotted lines in this image trace the left posterior cerebral artery and the hyperplastic left anterior choroidal artery, respectively.

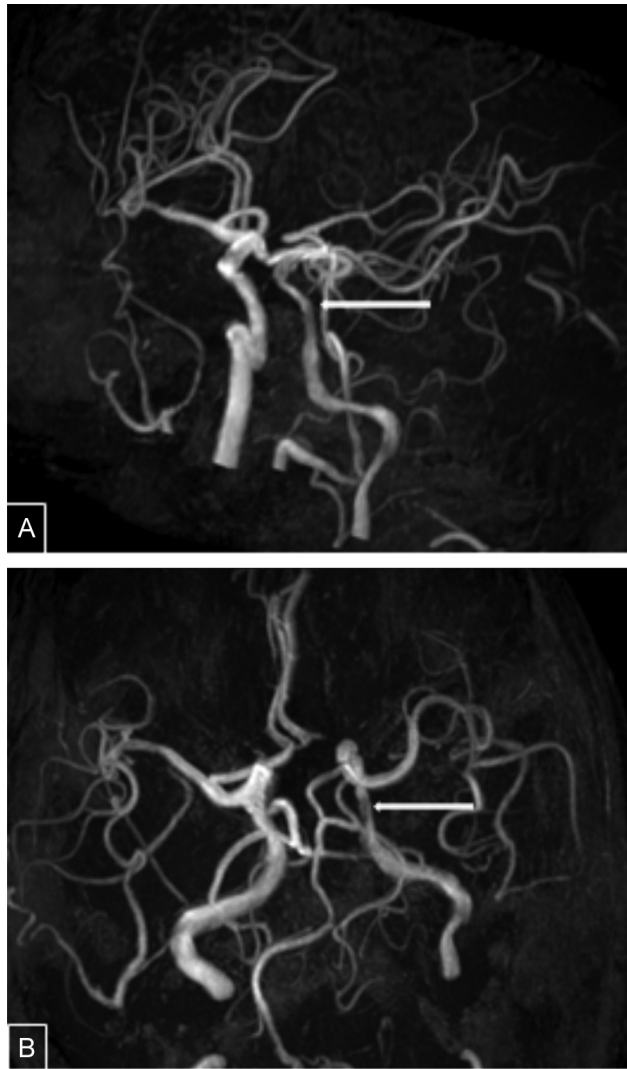


Fig. 4 Three-dimensional reconstructed time-of-flight images (A and B) show long segment narrowing of the left internal carotid artery (white arrow) with irregular caliber.

conservatively with antiplatelets with which his power improved on the left side. He later underwent a digital subtraction angiography that revealed significant narrowing of the left ICA for which he was advised carotid stenting. However, the patient was unwilling for the procedure and was discharged on oral medication with stable vitals.

Discussion

Anatomical variations in the intracranial vasculature are not only a point of academic interest but also have an important bearing on the distribution patterns of ischemic infarction and impact the endovascular approach to intracranial pathology. Most anatomical variations are somehow linked to the development of these vascular structures. Abnormal persistence or atresia of these vessels can result in some variations. A hyperplastic anterior choroidal artery is one such variation that results from the abnormal persistence of the fetal pattern of vascular supply. Initially, the anterior choroidal artery supplies most of the posterior temporal lobe and the occipital

lobe as well as a part of the parietal lobe. In the fetus, most of the brain is initially supplied by the ICA system and as the vertebro-basilar arterial system develops, it gradually takes over part of its supply.³ In some patients however, the anterior choroidal artery may continue to supply this territory and it often may resemble the PCA in caliber giving the false impression of the presence of a double PCA. Hyperplastic anterior choroidal artery is more prone to the development of aneurysms than a normal anterior choroidal artery.⁴ With an incidence of 1.8 to 2.3%, the presence of a hyperplastic anterior choroidal artery remains a rather uncommon anomaly.⁵ It is important to recognize the presence of a hyperplastic anterior choroidal artery as it impacts both disease presentation and management of these patients. MR angiography allows for noninvasive and reliable detection of these anomalies in patients without the risks associated with radiation or contrast exposure in conventional/CT angiography.⁶

The presence of a fetal PCA has also been associated with a degree of hypoplasia of the basilar artery and with a higher risk of infratentorial strokes.⁷ In our case, the patient also had an acute infarction of the right medial thalamus and right half of the midbrain, areas that are typically supplied by the thalamoperforating branches of the P1 segment of the PCA. In our case, it is possible that the infarct territory was influenced by this variation.

Our particular case is unique as it has two of the most common arterial anatomical variations, that is, the fetal origin of the PCA and a hypoplastic A1 segment of the ACA coexisting with a hyperplastic anterior choroidal artery, which is a relatively uncommon anomaly.⁸

Variations in arterial anatomy and supply are very common and are often thought of as being more or less benign. However, they have important consequences on clinical presentation of patients and the approach to treatment. Knowledge of these variations is a must for the radiologist.

Authors' Contributions

Ankita Shah was involved in data collection and manuscript preparation and review. Anagha Joshi prepared and reviewed the manuscript. Pareekshith R. Rai and Pratik Kapse contributed in data collection and manuscript preparation.

Conflicting Interest

None declared.

References

- 1 Takahashi S, Suga T, Kawata Y, Sakamoto K. Anterior choroidal artery: angiographic analysis of variations and anomalies. *AJNR Am J Neuroradiol* 1990;11(04):719–729
- 2 Dimmick SJ, Faulder KC. Normal variants of the cerebral circulation at multidetector CT angiography. *Radiographics* 2009;29(04):1027–1043
- 3 Das D, Kumar R, Dutta A. Hypertrophic anterior choroidal artery: images and brief embryological overview. *BMJ Case Rep* 2021;14(01):e240328
- 4 Hyun DK, Shim YS, Park HS, Oh SY. Thromboembolic complication following neurointervention in ruptured anomalous hyperplastic anterior choroidal artery aneurysm. *Neuroradiol J* 2014;27(01):103–107

- 5 Iihoshi S, Nonaka T, Miyata K, Houkin K. [Angiographic analysis of variations and anomalous origin of the anterior choroidal artery and posterior communicating artery]. *No Shinkei Geka* 2010;38(06):523–530
- 6 Uchino A, Saito N, Takahashi M, Okano N, Tanisaka M. Variations of the posterior cerebral artery diagnosed by MR angiography at 3 tesla. *Neuroradiology* 2016;58(02):141–146
- 7 Strecker N, Kahles T, Kubacka M, et al. Abstract WP225: fetal-type posterior cerebral artery: a not so benign anatomical variant? *Stroke* 2020;51(01):225
- 8 Zampakis P, Panagiotopoulos V, Petsas T, Kalogeropoulou C. Common and uncommon intracranial arterial anatomic variations in multi-detector computed tomography angiography (MDCTA). What radiologists should be aware of. *Insights Imaging* 2015;6(01):33–42