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Case Report

An anomalous hyperplastic anterior choroidal artery associated with an unruptured internal carotid–posterior communicating artery aneurysm ☆,☆☆,★

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ABSTRACT

The anterior choroidal artery (AChA) injuries can result in severe neurologic deficits, so requiring careful observation to avoid inadvertent damage during neuroendovascular procedures. In this case report, we present the unusual case of an anomalous hyperplastic AChA associated with a fetal-type posterior communicating artery (PCoA), and an unruptured internal carotid artery (ICA) –PCoA aneurysm. A 54-year-old woman presented with persistent headache. Brain magnetic resonance imaging (MRI) showed an unruptured cerebral aneurysm in the right ICA, and cerebral angiography revealed a proximal fetal-type PComA and a distal anomalous hyperplastic AChA. Coil embolization was performed with no neurologic deficits and the target lesion was embolized with a total of 6 coils. An anomalous hyperplastic AchA has a lengthy course with numerous choroidal and perforating branches, and therefore, an abundant perfusion region. Thorough knowledge of the development and anatomy of anomalous arteries is important for safely performing endovascular procedures without causing any ischemic complications.

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Introduction

The anterior choroidal artery (AChA) generally branches from the internal carotid artery (ICA) distal to the posterior communicating artery (PComA). From an embryologic or neuroradiological point of view, several reports [5,6] describe an anomalous hyperplastic anterior choroidal artery (AChA) that supplies several critical structures in the temporal and occipital lobes normally supplied by the posterior cerebral artery (PCA). We report the case of an anomalous hyperplastic AChA associated with a fetal-type PComA and an unruptured ICA-PComA aneurysm, which was incidentally found during a detailed workup for headache, and was treated with endovascular surgery without any complications.

Case report

A 54-year-old woman visited our hospital with the chief complaint of persistent headaches. Brain magnetic resonance angiography (MRA, Fig. 1) performed for screening purposes revealed an unruptured cerebral aneurysm of approximately 9 mm × 7 mm × 7 mm in the right ICA in the posterolateral direction. In addition, 2 blood vessels running parallel to each other posteriorly from the same site were observed. Cerebral angiography (Fig. 2; digital subtraction angiography, DSA; Fig. 3; 3D rotation angiography) revealed that the proximal vessel was a fetal-type PComA, and the distal vessel was an anomalous hyperplastic AChA. In the Allcock test of the vertebral artery (Fig. 4), there was abnormal enhancement of

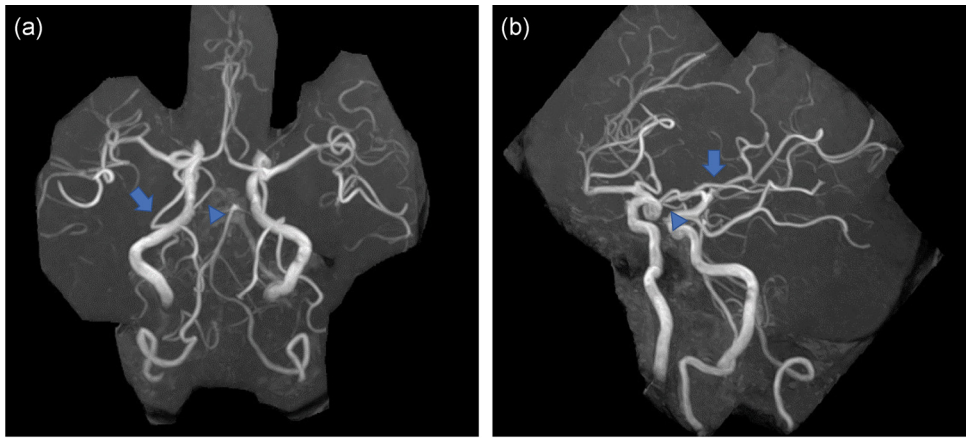

Fig. 1 – Magnetic resonance angiography showing that the posterior cerebral artery (arrow) is supplied by the internal carotid artery rather than the basilar artery. A foetal-type posterior communicating artery (arrowhead) was also observed (A: anteroposterior view; B: oblique view).

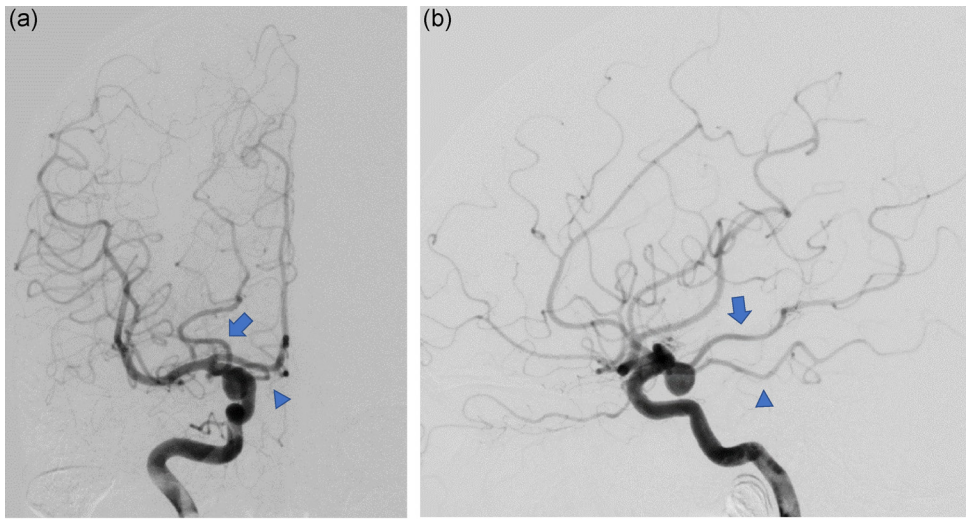

Fig. 2 – Cerebral angiography of the right common carotid artery showing that the proximal vessel is a fetal-type posterior communicating artery (arrowhead) and the distal vessel is the anomalous hyperplastic anterior choroidal artery (arrow). (A: anteroposterior view; B: lateral view).

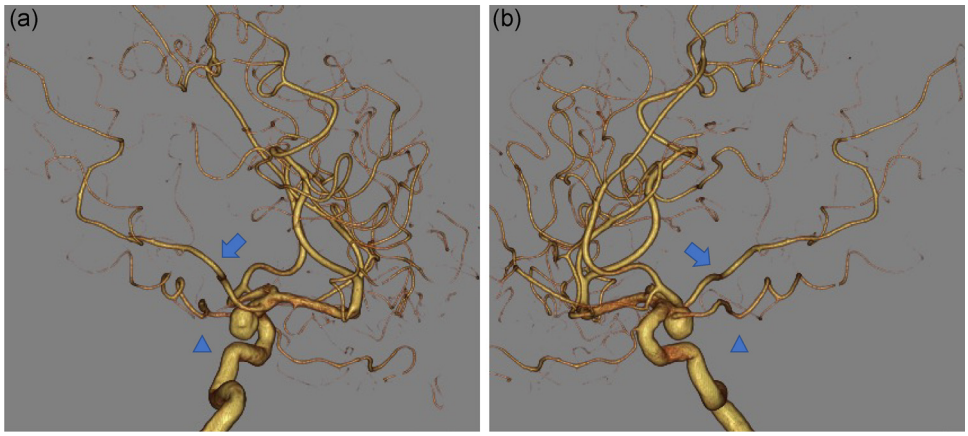

Fig. 3 – 3D rotation angiography of the right common carotid artery showing that the proximal vessel is a fetal-type posterior communicating artery (arrowhead) and the distal vessel is the anomalous hyperplastic anterior choroidal artery (arrow). (A, B: oblique view).

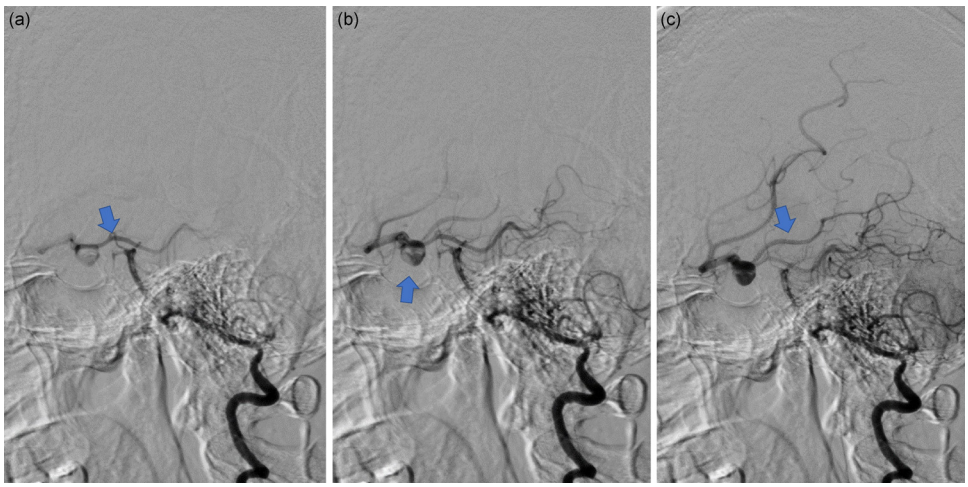

Fig. 4 – (A-C) Allcock test of the vertebral artery showing abnormal enhancement of the anomalous hyperplastic anterior choroidal artery distally from the posterior communicating artery via the internal carotid artery. (Arrows indicate the sequential enhancement of the posterior communicating artery, aneurysm, and anomalous hyperplastic anterior choroidal artery during the test).

the anomalous hyperplastic AChA distal to the PComA via the ICA.

Based on the patient's relatively young age and large aneurysm size, the risk of aneurysmal rupture was considered high, and cerebral aneurysm coil embolization was performed. The target lesion was embolized with a total of 6 coils (Target XL 360 Soft 8 mm × 30 cm, Galaxy Complex Fill 5 mm × 15 cm, 5 mm × 10 cm, 4 mm × 10 cm, Target 360 Ultra 2 mm × 4 cm, Target 360 Nano 2 mm × 3 cm), and VER was 25.5%. Postoperative cerebral angiography (Fig. 5) showed successful complete embolization of the aneurysm and no cerebral thromboembolism. The patient was discharged with no neurologic signs or symptoms. A follow-up MRA performed 6 months after the surgery did not show any residual or recurrent aneurysm (Fig. 6). The patient has been followed up for 2 years and has shown no ischemic or thromboembolic complications. Written informed consent was obtained from the patient for the publication of this case report.

Discussion

The anomalous hyperplastic AChA is considered to be a rare anomaly found in only 1.1%-2.3% of cerebrovascular angiographies [5,6]. The blood vessels that supply the posterior part of the cerebral hemisphere originate from the AChA in the early embryonic stage, but transition to the PCA as the circle of Willis develops. Insufficient development of the PCA leads to residual cortical branches of the AChA, which is thought to be the cause of arterial anomalies [2].

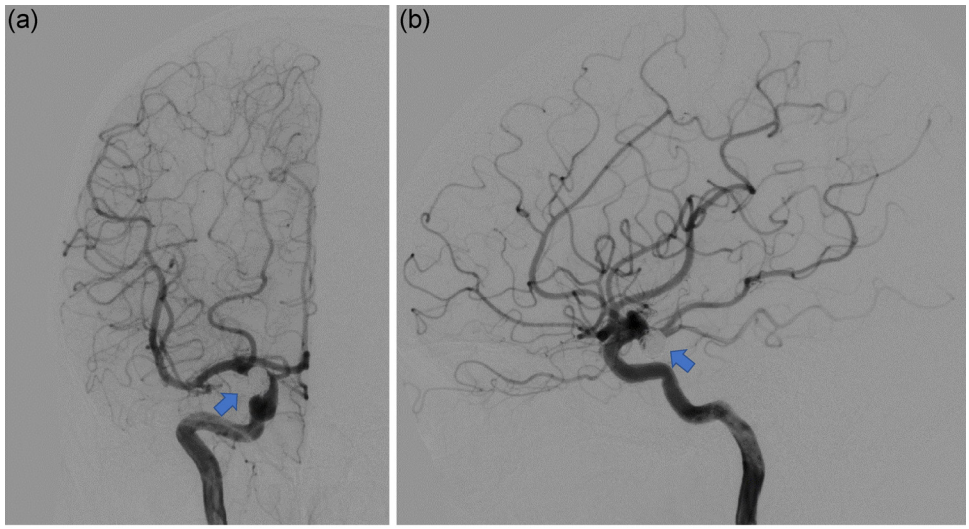

Fig. 5 – Digital subtraction angiography (post embolization) showing complete aneurysmal occlusion (arrow) with no associated cerebral infarction. (A: anteroposterior view; B: lateral view).

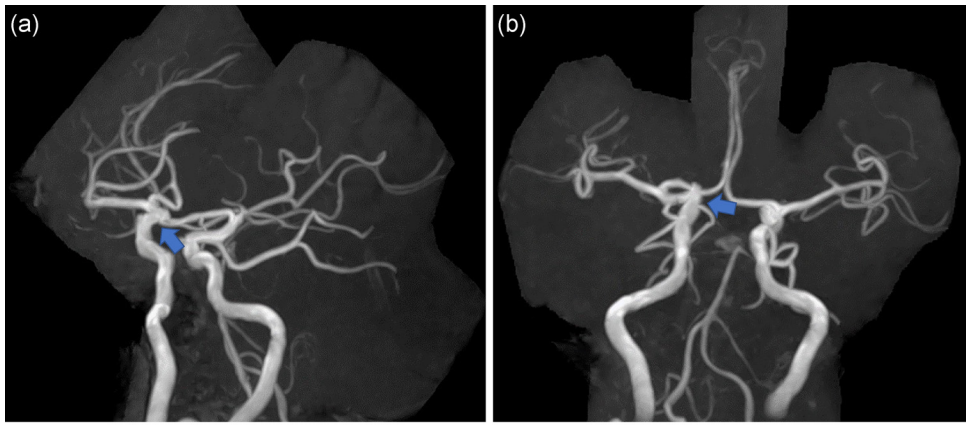

Fig. 6 – Magnetic resonance angiography at 6 months follow-up showing no residual or recurrent aneurysm (Arrows indicate the location of the occluded aneurysm). (A: oblique view; B: anteroposterior view).

In the current case, the anomalous hyperplastic AChA was accompanied by a foetal-type PComA, and an aneurysm at the ICA-PComA junction. AChA aneurysms are rare and account for 2%-5% of all intracranial aneurysms [3]. However, AChA aneurysms are more likely to occur in the presence of hyperplastic AChAs. Takahashi et al [6]. reported that 24% of anomalous hyperplastic AChAs were accompanied by choroidal artery aneurysms, with 8% of aneurysms occurring at its bifurcation. As the AChA is an end artery usually without any anastomosis or perfusion from other arteries, injuries to the AChA can cause severe neurologic deficit [1]. Furthermore, an anomalous hyperplastic AchA has a lengthy course with numerous choroidal and perforating branches and, therefore, an extensive perfusion region. There are reports of unexpected embolic complications in the perfusion region following endovascular surgery of anomalous cerebral arteries [1]. Foetal-type PComA is observed in approximately 20%-30% of the population and has important implications on the vascular anatomy and cerebral perfusion [4]. Therefore, thorough knowledge about the development, and anatomy of anomalous arteries is important for safely performing endovascular procedures without causing any ischemic complications.

Conclusion

Few cases of endovascular procedures for cerebral aneurysms associated with AChA hyperplasia have been reported in the past, and aneurysms associated with AChA hyperplasia are considered extremely rare. We reported a case in which the endovascular procedure could be safely performed because of accurate knowledge of the anatomy of the anomalous cerebral artery.

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