

Case Report

Diagnosis of Persistent Primitive Olfactory Artery Using Computed Tomography Angiography

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Persistent primitive olfactory artery (PPOA) is a rare anomaly of the anterior cerebral artery. We present one case of PPOA incidentally diagnosed with the aid of computed tomography (CT) angiography. A 24-year-old woman was admitted to our hospital after sudden onset of vertigo. Three-dimensional CT angiography revealed an anomalous artery arising from the terminal portion of the right internal carotid artery. The proximal portion of the anomalous artery coursed anteromedially and made a hairpin turn posterosuperior to the midline. PPOA may be overlooked because of its rarity, but CT angiography can be useful in detecting this rare vascular anomaly. Follow-up study is necessary in our case to confirm whether an aneurysm occurs on the PPOA.

Key Words : Olfactory · Artery · Persistent.

INTRODUCTION

Persistent primitive olfactory artery (PPOA) is a rare anomaly of the anterior cerebral artery. In some cases, it is found incidentally without any associated symptoms. However, it is frequently associated with a saccular aneurysm at the hairpin turn and with anosmia^{3,4,6}. All cases except one⁸) have been reported from Japan. One Korean case diagnosed by computed tomography (CT) angiography has been reported⁹). We present a case of PPOA incidentally diagnosed with the aid of CT angiography.

CASE REPORT

A 24-year-old woman was admitted to our hospital after sudden onset of vertigo. Neurological examination in the Emergency Department revealed no neurological deficit. Reconstructed post-enhancement CT imaging of the head showed an abnormal vessel (Fig. 1). Three-dimensional CT angiography revealed an anomalous artery arising from the terminal portion of the right internal carotid artery. The proximal portion of the anomalous artery ran anteromedially and made a hairpin turn posterosuperior to the midline. This anomalous vessel supplied the pericallosal artery (Fig. 2, 3), and was located in an anterior portion than left A2. The anomalous artery was interpreted as a PPOA. Com-

plete recovery from vertigo occurred within several hours.

DISCUSSION

CT angiographic features of PPOA

The anomalous artery described above is characteristic in that it arose from the terminal portion of the internal carotid artery, ran along the olfactory tract towards the olfactory bulb, made an abrupt posterior turn behind the olfactory bulb and became the distal anterior cerebral artery. This anomalous artery was considered to be a PPOA³), which is occasionally associated with a long anterior communicating artery and the absence of the recurrent artery of Heubner⁴). Typically, the PPOA runs along the olfactory tract anteriorly toward the crista galli. Both proximal portions of the PPOA remain along the olfactory tract, increasing the distance between the bilateral anterior cerebral arteries. However, Lin et al.²) also reported one case of interhemispheric PPOA. In that case, the long anterior communicating artery was not seen in place of the regular bilateral anterior cerebral artery A1 segment.

In our case, we could not clearly identify the long anterior communicating artery and the absence of the recurrent artery of Heubner.

Previous reports of PPOA

PPOA is a rare anomaly of the anterior cerebral artery. Nozaki et al.³) suggested that there are two variants of PPOA. In variant 1, the anomalous artery arises from the internal carotid artery, runs along the olfactory tract and makes a hairpin bend to supply the territory of the distal anterior cerebral artery. In vari-

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ant 2, the artery arises from the anterior cerebral artery and passes through the cribriform plate to supply the nasal cavity as the ethmoidal artery. Yamaura et al.⁷ reported the first case of variant 1 of this anomaly in 1979. Most cases have been diagnosed by angiography. Only one case of PPOA was diagnosed by magnetic resonance angiography⁵. Five cases, including our case, were diagnosed by CT angiography^{1,3,6,8}. All but one case were reported from Japan. One case diagnosed with CT angiography was reported from Korea⁹. In our patient with PPOA, CT angiography gave an excellent picture of the spatial relationship of the surrounding bony and vascular structures. In this case, CT angiography demonstrated the anteromedial course of the PPOA along the frontal base with an abrupt posterior turn.

Clinical implications of PPOA

This anomalous artery is often associated with cerebral aneurysms. The pathogenesis of cerebral aneurysms is not fully clarified, and both genetic and hemodynamic factors are considered to be involved. The hairpin bend location of the most common aneurysm may suggest the importance of hemodynamic stress in the occurrence of cerebral aneurysms³. Follow-up study is necessary in our case to confirm whether an aneurysm will occur on the PPOA. Although PPOA may be overlooked because of its rarity, the possibility of a high incidence of cerebral aneurysm should be kept in mind in clinical situations³.

Two reported cases of PPOA showed anosmia^{3,4}. Because the olfactory nerve was apparently intact in the operative findings in both cases, the arterial blood supply to the olfactory nerve might be involved in the pathogenesis of the anosmia³. This vascular anomaly should be included in the differential diagnosis in patients with persistent anosmia.

CONCLUSION

PPOA may be overlooked because of its rarity, but CT angiography can be useful in detecting this rare vascular anomaly. Our present case involves a young patient, and because a saccular aneurysm could develop in the future at the hairpin turn, she should be examined periodically with CT angiography.

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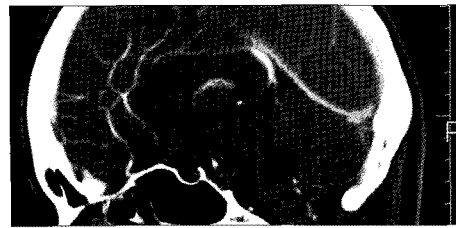


Fig. 1. Sagittal view of the multiplanar reconstructed computed tomographic image demonstrates the anomalous right anterior cerebral artery (ACA), coursing anteroinferiorly along the cribriform plate and making a hairpin turn posterosuperiorly to become the normal distal ACA.



Fig. 2. Three-dimensional computed tomography angiography shows the anatomical relationships among the bilateral internal carotid arteries, right persistent primitive olfactory artery, right distal anterior cerebral artery (ACA) and normal left ACA.

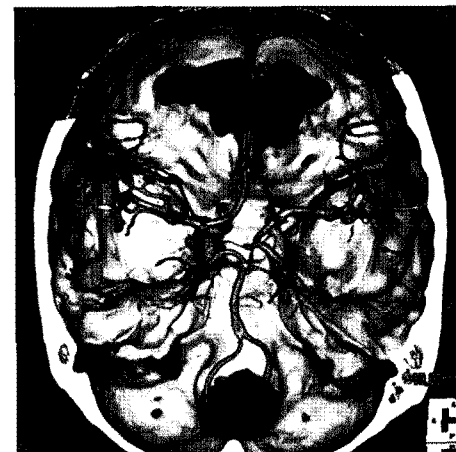


Fig. 3. Three-dimensional computed tomography angiography reveals the persistent primitive olfactory artery along the right frontal base and a sharp turn of this anomalous vessel.

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