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LETTER TO THE EDITOR

Persistent primitive olfactory artery

Masaki Komiyama

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I have read with great interest the paper recently published in your journal by Uchino et al. [5] describing the persistent primitive olfactory artery (POA). In the anatomical paper on cerebral arteries, two important points are required. One is description of the detailed arterial anatomy (static anatomy). In this sense, new information of the incidence of the POA being 0.14% and no laterality is provided. Another important point is embryological description to facilitate understanding of the anatomy and its variations (functional anatomy). In the latter sense, there is a serious misunderstanding of the POA in this paper, as well as the preceding papers [2, 4]. In these papers, it is described that the remnant of the POA is the recurrent artery of the Heubner (RAH), all of which quoted Padget's paper inappropriately [3].

Embryologically, the early brain vesicles are supplied by the primitive internal carotid artery, which is further divided into the rostral and caudal divisions (Fig. 1). The rostral division supplies the prosencephalon (rhinencephalon in lower vertebrates, thus the artery is called the olfactory artery), and constitutes the POA [3]. The POA terminates in the nasal fossa and the secondary artery constitutes the medial olfactory artery, which supplies the olfactory bulb (Fig. 2). The medial olfactory artery becomes the anterior cerebral artery proper, while the terminal portion of the POA usually regresses. Lateral olfactory branches of the POA include the RAH, anterior choroidal artery, lateral striate artery, and later middle cerebral artery [1] (Fig. 3). When the terminal portion of the POA does not regress, it is called the persistent POA. There are two types of the persistent POA [2]: type 1 artery has a hairpin turn along the olfactory bulb coursing postero-superiorly to become the distal anterior cerebral artery, and type 2 artery enters the nasal cavity and connects with the ethmoidal artery (Fig. 4). Type 2 artery is homologous to the internal ethmoidal artery in dogs. The RAH is an old branch of the lateral olfactory branches of the POA, supplying the rostral corpus striatum and internal capsule, which are completely different from the olfactory lobe.

Embryologically, the POA is the rostral division of the primitive internal carotid artery. The POA constitutes the anterior cerebral artery proper, and when the POA keeps its

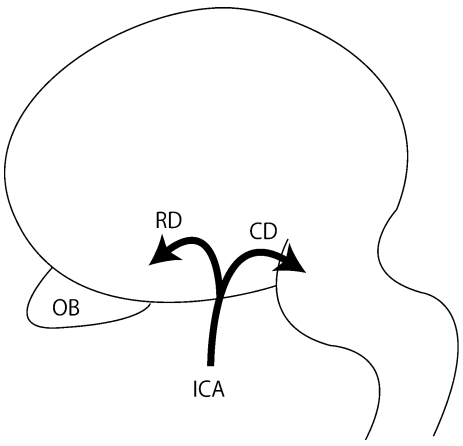

Fig. 1 Primitive internal carotid artery (ICA) is divided into two divisions: the rostral division (RD) and caudal division (CD). *OB* olfactory bulb

M. Komiyama (✉)
Center for Brain Vascular Diseases,
Osaka City General Hospital,
2-13-22, Miyakojima-Hondori,
Miyakojima, Osaka, Japan
e-mail: komiyama@japan-mail.com

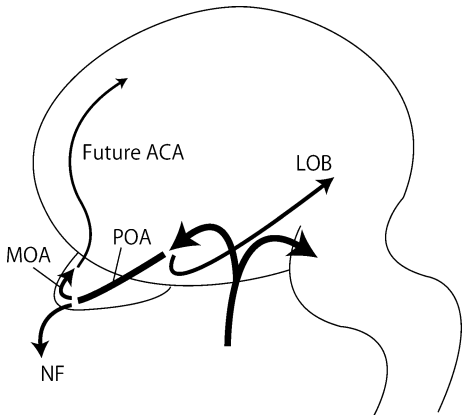

Fig. 2 The rostral division of the primitive ICA constitutes the primitive olfactory artery (POA), which terminates in the nasal fossa (NF). The secondary branch of the POA is the medial olfactory artery (MOA), which constitutes future anterior cerebral artery (ACA). Lateral olfactory branch (LOB) of the POA becomes apparent

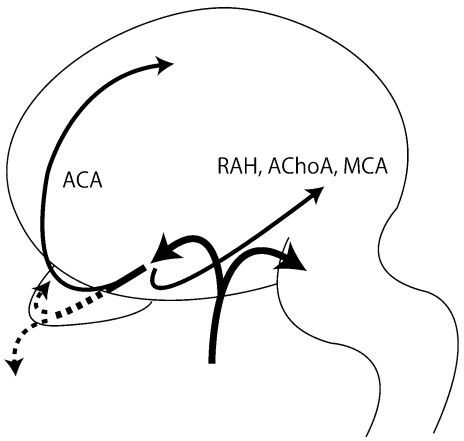

Fig. 3 After regression of the terminal portion of the POA, the MOA constitutes the ACA proper. Lateral olfactory branch includes the recurrent artery of Heubner (RAH), anterior choroidal artery (AChoA) and later middle cerebral artery (MCA)

embryological course along the olfactory bulb, it is called the persistent POA. The RAH belongs to the lateral branch of the POA, thus it is not the remnant of the POA.

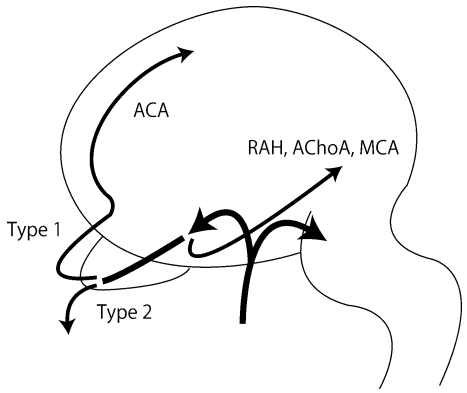

Fig. 4 There are two types of persistent POA: Type 1 artery has a typical hairpin turn along the olfactory bulb, and becomes the distal ACA, type 2 artery enters the nasal cavity and connects with the ethmoidal artery

Conflict of interest The author declares that I have no conflict of interest.

References

1. Lasjaunias P, Berenstein A, ter Brugge KG (2001) Intradural arteries. Surgical Neuroangiography, Clinical vascular anatomy and variations, vol 1 2nd edn. Springer, Berlin, pp 479–630
2. Nozaki K, Taki W, Kawakami O et al (1998) Cerebral aneurysm associated with persistent primitive olfactory artery aneurysm. Acta Neurochir (Wien) 140:397–402
3. Padget DH (1948) The development of the cranial arteries in the human embryo. Contrib Embryol 32:205–261
4. Tsuji T, Abe M, Tabuchi K (1995) Aneurysm of a primitive olfactory artery: case report. J Neurosurg 83:138–140
5. Uchino A, Saito N, Kozawa E et al (2011) Persistent primitive olfactory artery: MR angiographic diagnosis. Surg Radiol Anat 33:197–201