Persistent primitive olfactory artery: a hairpin easy to miss!

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DESCRIPTION
A 58-year-old woman presented with a severe headache without a history of seizure or neurological deficits. She was evaluated for subarachnoid haemorrhage. MR angiogram (figure 1) showed a hairpin curve of an anomalous artery in the location of left anterior cerebral artery (ACA). In its cranial course, it continued as pericallosal artery, supplying the left ACA territory. A long anterior communicating artery (AComA) widely separated it from right ACA. Corroborative CT angiogram (figure 2) with its superior resolution, established the absence of recurrent artery of Heubner as well as an aneurysm. Thus, a diagnosis of left persistent primitive olfactory artery (PPOA) was made, and our patient was advised follow-up imaging.

PPOA is a rare variant of ACA with 0.14% incidence, mostly reported in the East-Asian population. Embryologically, it results from non-involution of the cranial division of primitive internal carotid artery. Out of the described variants, first is an intracranial continuation as pericallosal artery after a paraolfactory hairpin curve, as seen in our case. The second variant shows transcranial continuation as ethmoidal artery supplying the nasal cavity. A transitional variant, branching out to continue as both the pericallosal and the ethmoidal arteries is described by Horie et al.

An aneurysm at its hairpin curve, resulting from the haemodynamic stress is found to be the most common cause of clinical presentation; anosmia related to altered olfactory nerve perfusion has also been implicated rarely. Three-dimensional TOF MR angiogram suffices to initially diagnose the PPOA and in its follow-up. CT angiogram is helpful to demonstrate the status of artery of Heubner, AComA and aneurysm with higher sensitivity.

Learning points
- Persistent primitive olfactory artery is a rare variant of anterior cerebral artery with a hairpin curve before its cranial course.
- It is associated with a vulnerability to develop an aneurysm at the acute curve due to haemodynamic stress.
- Pre-emptive identification and timely follow-up imaging may aid prevention and elective management of associated aneurysm.

CONTRIBUTORS
BH contributed in image acquisition workflow protocols, postprocessing and manuscript preparation. PS reviewed imaging, reporting and conceptualised the manuscript. AK and CKA reviewed imaging and provided intellectual contribution for manuscript preparation.

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