Accessory middle cerebral artery

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The accessory middle cerebral artery is a variant of the middle cerebral artery (MCA) that arises from the anterior cerebral artery (ACA). It is different from a duplicated middle cerebral artery, in which the duplicated vessel originates also from the distal end of the internal carotid artery (ICA).

Epidemiology

The prevalence of accessory MCA is ~2%.

Gross anatomy

It runs parallel to the course of the MCA and supplies some of the MCA territory. The accessory MCA typically supplies anterior frontal lobe.

Accessory MCA may arise from either the proximal or distal portion of the A1 segment of the ACA. There are classification systems (Teal and Manelfe) which reflect this.

Other common embryological variants of the MCA include duplicated middle cerebral artery (vessel arising from the ICA bifurcation, and typically supplying the anterior temporal lobe), and fenestrated middle cerebral artery.

Embryology

Accessory MCA may be present due to the persistence of two perforators. Early suggestions that the anomaly arises from a hypertrophied recurrent artery of Heubner (RAH) are now thought unlikely, as RAH often coexists, and the territory of supply is different. The vessel may be an anomalous early branch of the MCA.

Related pathology

There is an association between MCA variants and intracranial aneurysms. It is important to accurately document MCA anomalies as they have implications for operative or endovascular management [1)]

Case reports

A case of distal origin accessory MCA associated with ACoA duplication diagnosed by magnetic resonance angiography (MRA).

A 63-year-old man visited another hospital for screening examinations for cerebrovascular disease. He was noted to have a possible intracranial aneurysm at the A1-A2 junction of the right anterior cerebral artery on MRA. He was referred to the hospital for its management. More detailed 3-Tesla MRA volume rendering images revealed ACoA duplication, not an aneurysm. MRA also showed the right distal origin accessory MCA arising from the A2 segment distal to the ACoA duplication.

This rare combination of anatomical variations requires careful imaging assessment. MRA volume rendering images were useful in this case [2)].

This case report effectively showcases the diagnostic capabilities of high-resolution MRA in identifying complex cerebrovascular anomalies. However, it could benefit from a more detailed exploration of the clinical and hemodynamic implications of the findings, as well as follow-up data to guide management strategies. Despite its limitations, the report is a valuable contribution to the understanding of rare anatomical variations and the importance of advanced imaging in neurovascular diagnosis.

1)
https://radiopaedia.org/articles/accessory-middle-cerebral-artery
2)
Endo H, Ono H, Nakamura H. Accessory middle cerebral artery of distal origin associated with an anterior communicating artery duplication that mimicked an aneurysm. Surg Radiol Anat. 2024 Dec 22;47(1):39. doi: 10.1007/s00276-024-03542-3. PMID: 39710787.