

A ruptured anterior communicating artery aneurysm associated with internal carotid artery agenesis and a middle cerebral artery anomaly.

Case report

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*Key words:* internal carotid artery agenesis, cerebral aneurysm, middle cerebral artery anomaly

## **Abstract**

A case of agenesis of the internal carotid artery (ICA) associated with an anomalous middle cerebral artery (MCA) originating from the contralateral ICA is herein reported. This rare case presented with a subarachnoid hemorrhage (SAH) due to a rupture of an anterior communicating artery (ACoA) aneurysm.

## **1. Introduction**

Cases of agenesis of the ICA associated with an ACoA aneurysm have so far only sporadically been reported.<sup>1-3</sup> This report describes an extremely

rare case of a SAH due to a rupture of an ACoA aneurysm in a patient with agenesis of the left ICA associated with an anomalous left MCA originating from the right ICA.

## **2. Case report**

A 69-year-old female with a previous history of hypertension suddenly experienced a severe headache, and was admitted to our institution. Computed tomography (CT) demonstrated a diffuse thick SAH with a slight ventricular dilatation. Her neurological condition was WFNS grade II.

Conventional cerebral angiography revealed a superiorly projected small ACoA aneurysm and the left MCA originating from the C2 portion of the right ICA (Fig 1). Both the anterior cerebral arteries were supplied from the right ICA, while the left A1 segment was not observed. The left ICA was absent from the left common carotid injection. Vertebral angiography did not demonstrate the presence of the left posterior communicating artery. The venous structures were unremarkable.

The patient underwent a right frontotemporal craniotomy and neck clipping of the aneurysm at the ACoA. The operation revealed the left MCA to branch off in the medial wall at C2 portion of the right ICA, and then it coursed at a point inferior to the bilateral optic nerves. The absence of the left carotid canal was confirmed postoperatively on bone window settings of 3-dimensional cranial CT (Fig 2). She did not show any symptoms or signs suggesting the presence of a cerebral vasospasm, and she was thereafter discharged without any sequelae.

## **3. Discussion**

Agenesis of the ICA is defined by a congenital absence of the carotid canal,<sup>4</sup> and it has also been reported to often accompany other arterial abnormalities around the circle of Willis.<sup>5-7</sup> Although the occlusion of a

unilateral ICA has a potentially high risk of aneurysmal formation in the intracranial arteries,<sup>8,9</sup> only a few reports exist regarding the combination of a congenital absence of the ICA and an ACoA aneurysm.<sup>1-3</sup> Wong et al. reported an interesting case of such an aneurysm in a patient with a rare anatomic variant of a solitary ICA associated with moyamoya phenomenon of the MCA.<sup>10</sup>

In the present case, both MCAs originated from the right intracranial ICA. In addition, the left carotid canal was absent which was consistent with the findings of ICA agenesis. Similar to the cases with the ICA occlusion and aplasia of the A1 segment of ipsilateral anterior cerebral artery, an increased degree of hemodynamic stress is also considered to have contributed to the aneurysm formation at the ACoA.<sup>7</sup> Michalik et al. initially described a case of an absence of the ICA associated with an anomalous MCA originating from a contralateral ICA, although an absence of the carotid canal was not demonstrated radiographically.<sup>11</sup> In that case, the patient presented with a SAH due to a rupture of an ACoA aneurysm, which was a similar situation to the case presented in this report. While no other cases have been reported, this kind of anomalous MCA associated with ICA agenesis may therefore be underestimated because it tends to be asymptomatic unless the patient experiences a SAH.

#### **4. Conclusion**

This is the first confirmed case of ICA agenesis associated with a MCA originating from the contralateral intracranial ICA. These anatomical abnormalities had been asymptomatic until the patient experienced a clinical manifestation of SAH due to a rupture of an ACoA aneurysm. The timely recognition of this unusual course of the MCA is therefore considered to be important for selecting the optimal surgical treatment for such an aneurysm.

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### **Figure legends**

Figure 1:

Angiograms of the right ICA from the oblique projection demonstrating a superiorly projected small ACoA aneurysm and the left MCA originating from the C2 portion of the right ICA.

Figure 2:

Bone window setting of three-dimensional cranial CT demonstrating the absence of the left carotid canal (arrow).



