

## Case Report

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## Occlusion of the Middle Cerebral Artery Branch Mimicking Aneurysm

A 26-year-old man was admitted to our department due to intermittent left hemiparesis for 3 months. Magnetic resonance image showed subacute infarction in the right precentral gyrus. Digital subtraction angiography and magnetic resonance angiography revealed an aneurysmal protrusion at the right middle cerebral artery (MCA) bifurcation. It was difficult to differentiate the aneurysm from the occlusion of the middle trunk of the MCA trifurcation. Brain single photon emission computerized tomography showed a decrease in perfusion in the right posterior frontal lobe without vascular reserve. Therefore, we planned a superficial temporal artery-MCA anastomosis with an exploration of the right MCA bifurcation. Intraoperatively, the aneurysmal opacification on preoperative angiography proved to be the proximal stump of the occluded middle trunk of the MCA trifurcation. An aneurysmal protrusion at the MCA bifurcation does not always indicate an aneurysm. In diagnosing protruding vascular lesions at the MCA bifurcation, the possibility of a vascular stump should be considered according to their angioanatomical appearance and the history of the patient.

**KEY WORDS :** Middle cerebral artery · Aneurysm · Occlusion.

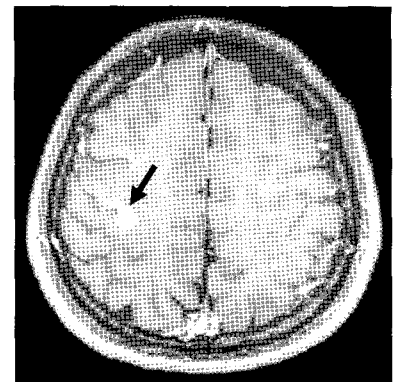
### INTRODUCTION

The proximal stump of an occluded cerebral artery can mimic an aneurysm on various angiograms<sup>5-8)</sup>. To our knowledge, only a few such cases have been previously reported, especially in association with posterior circulation<sup>5,7,8)</sup>. However, reports have rarely dealt with the middle cerebral artery (MCA)<sup>9)</sup>. Their differentiation is crucial to establishing the appropriate treatment. We report a unique case of the occluded middle trunk of MCA trifurcation which resembled a saccular aneurysm on preoperative angiogram.

### CASE REPORT

A 26-year-old man developed intermittent transient ischemic attacks causing left hemiparesis several times within 12 hours prior to admission. Each ischemic episode disappeared within 24 hours and the patient recovered completely without any residual deficits. The last transient ischemic attack was about 1 month before consultation. Past history was otherwise unremarkable.

There was no neurological deficit on admission. Magnetic resonance image showed subacute infarction in the right precentral gyrus corresponding to his symptom (Fig. 1). Digital subtraction angiography and magnetic resonance angiography revealed diffuse mild narrowing of the right MCA main trunk (M1) and an aneurysm-like shadow protruding at the right MCA bifurcation (Fig. 2). We could not rule out an aneurysm from an occluded middle trunk of the MCA trifurcation. Brain single photon emission computerized tomography with diamox showed a decrease in perfusion in the right posterior frontal lobe without vascular reserve. Therefore, we planned a superficial temporal artery (STA)-MCA anastomosis and exploration of the right MCA bifurcation by right frontotemporal craniotomy. Intraoperatively, no aneurysm was detected, instead, the aneurysmal opacification on preoperative angiograms proved to be the proximal stump of the occluded



**Fig. 1.** T1-weighted Gd-enhancement magnetic resonance image showing subacute infarction in the right precentral gyrus (arrow) presenting classic gyriform enhancement.

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**Fig. 2.** Conventional digital subtraction angiography (A) and three-dimensional reformation (B) reveal diffuse mild narrowing of the right MCA main trunk and an aneurysm-like protrusion (arrow) at the right MCA bifurcation. Similarly observed in magnetic resonance angiography (C).



**Fig. 3.** Intraoperative view of the right MCA exploration after right frontotemporal craniotomy. Aneurysmal opacification on preoperative angiograms proved to be the residual lumen (black arrow) of the occluded middle trunk of the MCA trifurcation. The occluded segment (white arrow) appears to be of a yellowish color due to atherosclerosis (IT : inferior trunk of the MCA trifurcation, M1 : main trunk of the MCA, MT : middle trunk of the MCA trifurcation, ST : superior trunk of the MCA trifurcation).

middle trunk of the MCA trifurcation (Fig. 3). The nodular appearance of the residual lumen of the occluded artery corresponded exactly to the angiographic findings. The occluded segment appeared to be of a yellowish color due to atherosclerosis and lacked blood flow. The distal stump of the occluded artery was patent and retrograde flow was detected. So, we performed a STA-MCA anastomosis safely without more exploration. The postoperative course was uneventful and no additional transient ischemic attacks have occurred.

## DISCUSSION

Though exceedingly rare, a stump of occluded vessels may be misinterpreted as an aneurysm on cerebral angiogram<sup>5-8</sup>. Kawanishi et al.<sup>6</sup> reported a case with occlusion of the posterior communicating artery mimicking cerebral aneurysm.

They suggested in diagnosing protruding vascular lesions at the bifurcation between the internal carotid artery and the posterior communicating artery, not only infundibular dilatation but also occlusion of the posterior communicating artery should be considered if the posterior communicating artery is not visualized<sup>2,3</sup>.

Komiyama and associates<sup>7</sup> similarly reported that the arterial stump of an occluded intracranial vertebral artery may mimic an aneurysm at the vertebrobasilar junction. The differentiation is crucial because their natural history and treatment are radically different. They recommended that magnetic resonance images with three-dimensional constructive interference in steady state sequences can be a useful adjunct for establishing the differential diagnosis and avoiding unnecessary exploratory surgery.

Nakano et al.<sup>8</sup> described the case of a 63-year-old female with subarachnoid hemorrhage who had a stump of occluded posterior cerebral artery mimicking a ruptured aneurysm of the basilar bifurcation. Because of the nodular appearance and upward direction of the stump of the P1 segment, it was misinterpreted as an aneurysm. During the operation, a tiny ruptured aneurysm missed on preoperative angiograms was found in the left A1-A2 junction and was clipped safely<sup>1-4</sup>. Kalia and colleagues<sup>5</sup> reported a patient with a subarachnoid hemorrhage in whom a partially thrombosed, fenestrated basilar artery mimicking an aneurysm of the vertebrobasilar junction was seen on preoperative angiography. Intraoperatively, no aneurysm was detected. Instead, the patient was found to have partial thrombosis of one limb of the fenestrated basilar artery. The nodular appearance of the residual lumen of the vessel corresponded exactly to the angiographic finding.

To our knowledge, only a few such cases have been previously reported, especially in association with posterior circulation as mentioned above<sup>5,7,8</sup>. However, rare reports have dealt with MCA<sup>9</sup>. Their differentiation is important to establish

the appropriate treatment. As in our case, it is difficult to differentiate an aneurysm from occlusion of one trunk of the MCA trifurcation. Neurosurgeons are familiar with MCA bifurcation aneurysms and easily overlook such an occlusive lesion.

Considering the present case retrospectively, the angiographic finding of the residual lumen caused by atheromatous occlusion was the rod or cone-like appearance<sup>8)</sup>. That is to say, the diameter of the aneurysm narrows at the fundus of the sac in contrast with a saccular aneurysm. It could help to differentiate a proximal or distal stump from saccular aneurysms on cerebral angiography.

## CONCLUSION

An aneurysmal protrusion at the MCA bifurcation does not always indicate an aneurysm on cerebral angiogram. In diagnosing protruding vascular lesions at the MCA bifurcation, an occlusion of one trunk of the MCA trifurcation should be considered according to their angioanatomical appearance and the history of the patient. Their differentiation is crucial to establishing the appropriate treatment.

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