

Multiple Aneurysms on the Same Bifurcation Site of the Middle Cerebral Artery

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Multiple aneurysms at the same cerebral arterial branching site are rare, and have been mainly described in a few case reports in comparison with other intracranial multiple aneurysms. Most reported locations of the same artery where multiple aneurysms developed were internal carotid artery and anterior communicating artery. We experienced a very rare case of multiple aneurysms arising at the same bifurcation site of the middle cerebral artery. Only one case like this has been reported previously in the literature. We discussed the preoperative diagnosis and surgical management of such condition.

KEY WORDS : Multiple aneurysm · Same location · Middle cerebral artery.

Introduction

Although the incidence of multiple aneurysms of the cerebral arteries is not low, the occurrence of more than one aneurysm developing on the same artery is quite rare. We have found only few reports of such cases in the literature. All reported multiple aneurysms at the same arterial location developed on the internal carotid artery (ICA), the anterior communicating artery (ACoA) and the middle cerebral artery (MCA)^{1-4,6,7,11,13,14}. For the accomplishment of successful clipping of aneurysms, preoperative awareness of the disease entity is important as sufficient exposure of the surgical field for all aneurysms is necessary to avoid intraoperative complications. We report a case of multiple aneurysms at the same MCA bifurcation site, specially focused on the significance of diagnosis and surgical management.

Case Report

A 59-year-old female suffered from a continuous headache and posterior neck discomfort after a subarachnoid hemorrhage that developed two days before admission. Neurological examination showed no deficit other than mild neck stiffness. The computerized tomography (CT) revealed a subarachnoid hemorrhage in the basal cistern and the left

sylvian cistern. In the patient's medical history, she had taken regular medicines for control of essential hypertension and diabetes mellitus over the past 10 years. There were no abnormal findings in the vital signs and the routine laboratory examinations. CT angiography performed by manipulation of three dimensional rotation showed three aneurysms : one aneurysm of the ACoA and two aneurysms at the same



Fig. 1. Preoperative computerized tomography angiography imaging by manipulation of three dimensional rotation demonstrating one aneurysm of the anterior communicating artery and two aneurysms at the same bifurcation site of the left middle cerebral artery.

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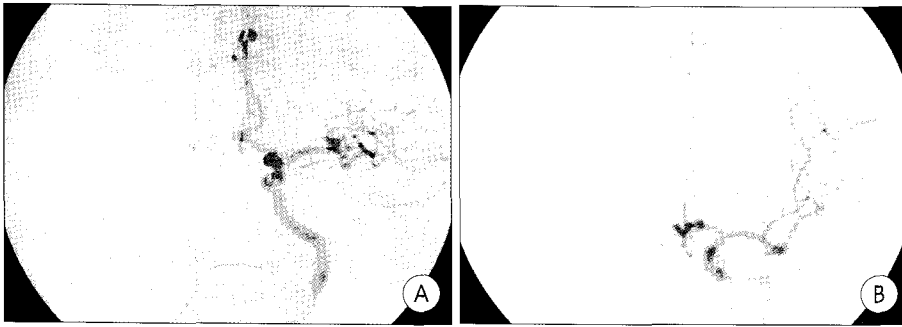


Fig. 2. Preoperative left carotid angiography showing one aneurysm of the anterior communicating artery and separately developed two aneurysms at the middle cerebral artery bifurcation in submentovertex view (A), that can not be verified in Town's view (B).

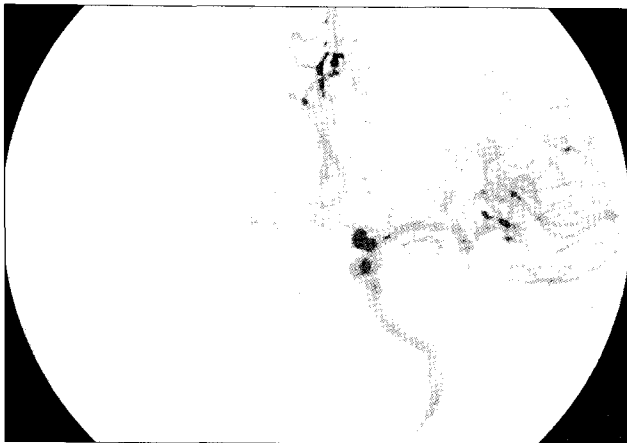


Fig. 3. Postoperative left carotid angiography showing complete obliteration of anterior communicating artery aneurysm and two aneurysms of the middle cerebral artery bifurcation site.

bifurcation site of the left MCA (Fig. 1). In order to confirm the finding of multiple aneurysms at the left MCA bifurcation, cerebral angiography was performed. Left carotid angiogram with submentovertex view revealed two separate aneurysms at the MCA bifurcation that could not be verified by routine angiographic projections (Fig. 2).

The patient underwent surgery using the standard pterional approach. Meticulous dissection and wide opening of the left sylvian cistern was performed to obtain a better exposure of the MCA bifurcation area. Bearing in mind that there would not be a single bi- or multilobular aneurysm but two independent aneurysms, very cautious dissection was performed and the necks of the aneurysms were clearly prepared. In order to avoid clip collision or restriction of the surgeon's view that could cause difficulty in a second clip application, the deepest aneurysm was clipped first and the other aneurysm was clipped successfully without difficulty. An aneurysm of the ACoA was also clipped in an one-stage operation. The postoperative course of the patient was uneventful and follow-up cerebral angiography demonstrated that all aneurysms were completely obliterated by the application of separate clips (Fig. 3).

Discussion

The incidence of multiple cerebral aneurysms has been well documented and accounts for 5-30% of all intracranial aneurysms^{5,8-10,15}. The vast majority of multiple aneurysms simultaneously arise at different sites of the cerebral arteries, but more than one aneurysm at the same branching site have been very rarely reported.

Kojima, et al. have reviewed 59 cases with multiple aneurysms of a total of 356 patients with intracranial aneurysms and reported 10 cases of multiple aneurysms arising at the same artery with an incidence of 2.8%⁷. In review of the relevant literature of multiple aneurysms on the same artery, the ICA was most frequent site that accounted for 19 cases^{4,7,11}. The ACoA represented the next common occurrence. Five patients were described in case reports^{1,6,7,13,14} and Inci, et al. described six cases of their 146 patients with ACoA aneurysms that represented an incidence of 4.1%³. We have found a few cases (three patients) with multiple aneurysms on the same MCA describing diagnosis and surgical treatment in the relevant literature. Kojima, et al. reported two patients out of 10 cases with multiple aneurysms on the same MCA⁷. However, multiple aneurysms at the same branching site of the MCA have been reported only in one patient while another patient had two aneurysms at different sites of the same MCA. Cedzich, et al. reported one rare case of multiple MCA aneurysms in an infant found at different sites of the same artery².

The pathogenesis of multiple aneurysms on the same artery can not be distinguished from other berry aneurysms because of insufficient number of reported cases. However, similar to previously reported cases, our patient did not have other related diseases such as arterial fenestration, arteriovenous malformation, polycystic kidney, coarctation of the aorta or mycotic disease. The patient had only hypertension and then, it is speculated that the pathogenesis is multifactorial including hemodynamic factor like other berry aneurysms^{3,12}.

Fortunately, we were aware preoperatively that the aneurysmal image at the MCA bifurcation could be multiple, not a single bi- or multilobular aneurysms, using the special views of conventional and CT angiography. Inci, et al. cautioned about misinterpretation of findings of multiple aneurysms on the same short artery as a multilobular aneurysm by conventional angiography. This misinterpretation could result in unwanted intraoperative complications³. They had difficulties with aneurysmal clipping of their cases because of the narrow working area for aneurysmal dissections and restriction of the

surgeon's view for second clip application due to inadequate clip sequencing. In case of multiple aneurysms at the ACoA, they recommended routine resection of the gyrus rectus to obtain a better operative exposure and temporary occlusion of the parent arteries to prevent intraoperative rupture of the multiple aneurysms in the relatively narrow operative field. We also recommend their opinions when treating cases of multiple aneurysms at the MCA bifurcation including the wide opening of the Sylvian cistern and if necessary, temporary occlusion of the parent arteries.

Conclusion

We report a rare case of multiple aneurysms at the same MCA bifurcation. Despite its rare occurrence, the possibility of multiple aneurysms at the same arterial site should be considered. Determination of a surgical strategy such as more extended surgical views and dissection with good exposure of aneurysms is a key for successful outcome.

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