Aneurysm of the Lenticulostriate Artery

—Report of Four Cases—

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Abstract

Four rare cases of aneurysm of the lenticulostriate artery (LSA) are presented. LSA aneurysms were located at the origin in three patients and distally in one. Two cases were of multiple aneurysms, one was associated with hypertensive intracerebral hematoma (putaminal hemorrhage), and the other with moyamoya disease. Two patients were successfully treated by microsurgical procedures. The occurrence of LSA aneurysm suggests that aneurysm formation and growth are accentuated by hemodynamic alteration and stress.

Key words: cerebral aneurysm, lenticulostriate artery, hypertension, moyamoya disease

Introduction

Aneurysms of the lenticulostriate artery (LSA) are very rare and may be associated with hypertensive intracerebral hematoma, arteriovenous malformation (AVM), systemic lupus erythematosus (SLE), and moyamoya disease. The proposed etiology for intracranial aneurysms is the development of congenital defects in the arterial wall in response to arteriosclerosis and hypertension. Few studies of LSA aneurysm have been made to investigate the pathogenesis of aneurysm formation and growth. Here, we report four cases of LSA aneurysm and discuss possible mechanisms of aneurysm formation.

Case Reports

Case 1: A 59-year-old female had a sudden onset of severe headache associated with vomiting and neck stiffness in 1978. A lumbar puncture found bloody cerebrospinal fluid (CSF). Carotid angiograms demonstrated an aneurysm at the origin of the anterior communicating artery (AComA) with hypoplasia of A1 portion of the right anterior cerebral artery, and another at the origin of the right lateral LSA (Fig. 1). The subarachnoid hemorrhage (SAH) was due to rupture of the AComA aneurysm. This was successfully clipped 25 days after SAH. The LSA aneurysm was wrapped at the same time. She has since remained well.

Case 2: A 59-year-old female had a sudden onset of headache accompanied by neck stiffness in 1984. Computed tomographic (CT) scans revealed SAH. Cerebral angiograms demonstrated aneurysms at the origins of the left ophthalmic artery (OphA), the left anterior choroidal artery (AChA), and the left lateral LSA (arrow) and AComA (arrowheads).
lateral LSA (Fig. 2 upper). The three aneurysms were clipped 4 days after SAH. The ruptured AChA aneurysm appeared macroscopically to have caused SAH. Postoperative cerebral angiograms revealed incomplete clipping of the ruptured AChA aneurysm (Fig. 2 lower). However, she has not complained of headache or vomiting for 4 years.

**Case 3:** A 44-year-old hypertensive female developed headache, transient loss of consciousness, and right hemiparesis in 1980. Neurological examination revealed stupor, neck stiffness, early papilledema, and right hemiparesis. CT scans demonstrated left putaminal hematoma associated with SAH (Fig. 3). The hematoma was removed completely through a craniotomy. Carotid angiograms showed an aneurysm at the distal portion of the left lateral LSA (Fig. 4). She refused another operation. However, there has been no rebleeding for 8 years.

**Case 4:** A 32-year-old male developed sudden, severe headache associated with neck stiffness in 1978. A lumbar puncture found bloody CSF. Four-vessel angiograms demonstrated occlusion at the terminal portions of bilateral internal carotid arteries, moyamoya vessels, and an aneurysm at the origin of the left medial LSA (Fig. 5). He was treated conservatively. He has presented no neurological deficits for 10 years.

**Discussion**

The rupture of intracerebral microaneurysms (miliary aneurysms) is well-known to cause hypertensive intracerebral hematoma. Cole and Yates\(^{1,2}\) stated that the microaneurysms formed during the aging process of arterial walls and that this was accen-
Fig. 5 Case 4. Right (left) and left (right) carotid angiograms, showing occlusion at the terminal portions of the internal carotid arteries, moyamoya vessels, and an aneurysm (arrow) at the origin of the left medial LSA.

Intracerebral microaneurysms were therefore considered to be pseudo-aneurysms, indicating focal bleeding in the brain tissue. However, Murakami et al. suggested that the microaneurysms is a true aneurysm histologically and occurs on the moyamoya vessels developed as collateral circulation. They concluded that the hemodynamic mechanism might cause intracerebral aneurysm with moyamoya disease. This mechanism may have occurred in our Case 4, which demonstrated a saccular aneurysm at the origin of the medial LSA causing SAH.

Yasargil described 14 cases of small aneurysm at the origin of the LSA, including six (42.9%) with multiple aneurysms. However, no further information was given. Crompton examined 154 cases of ruptured aneurysm, 37 (24%) of which arose from the middle cerebral artery (MCA). Seven of these occurred at the origin of the early branches of the MCA. Our Case 1 demonstrated SAH due to a ruptured aneurysm at the origin of the AComA and Case 2 at the AChA. Both cases had unruptured small aneurysms at the origin of the LSA. Such aneurysms are frequently multiple and demonstrate a remarkable difference in size between parent and perforating arteries. Crompton examined 101 arterial forks of the MCA in both sexes, with and without aneurysms. He found medial defects at almost all forks in both sexes and in aneurysmal and nonaneurysmal groups. Most authors consider that saccular aneurysms form in the region of the medial gap. Aging of the arterial wall due to hemodynamic stress is an important factor in adults.

Two of our four patients received surgical treatment for unruptured LSA aneurysm. Case 1 was treated by gauze wrapping and Case 2 by neck clipping. After surgery, clipping was complete and no kinking and obstruction of the LSA were found. Crompton and Krayenbühl and Yasargil pointed out that operative approaches to aneurysms at the origin of the early MCA branch might cause traction on perforating arteries already grossly insulted by the rupture of the closely adjacent aneurysm, and therefore extremely sensitive to further trauma. We found that direct microsurgery can be safely and successfully performed.

References

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