Saccular Aneurysm of the Accessory Middle Cerebral Artery

—Case Report—

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Abstract

A 30-year-old man presented with a rare ruptured saccular aneurysm located at the junction of the accessory middle cerebral artery and the horizontal portion (A_1 segment) of the anterior cerebral artery. A right frontotemporal craniotomy was performed and the aneurysm was clipped through a transsylvian approach. The postoperative course was uneventful and he was discharged in good condition. The transsylvian approach is the method of choice for such aneurysm.

Key words: aneurysm, accessory middle cerebral artery, subarachnoid hemorrhage

Introduction

Aneurysms rarely occur at the origin of the accessory middle cerebral artery (MCA). There have been only nine previous reports of accessory MCA aneurysms, including seven saccular aneurysms arising from the origin of the accessory MCA.^{2-5,8,10-12,14)} We present another case of a ruptured saccular aneurysm arising from the origin of the accessory MCA.

Case Report

A 30-year-old man suffered sudden onset of severe headache and vomiting but he did not lose consciousness. He visited a local clinic the next day, and referred to our hospital 2 days after the onset.

On admission, he was alert and complained of a severe headache, nausea, and vomiting. Neurological examination found no deficit. Computed tomography (CT) revealed mild subarachnoid hemorrhage in the basal and interhemispheric cisterns, predominantly located on the right. Right internal carotid angiography and three-dimensional CT angiography showed the accessory MCA originating from the horizontal portion (A_1 segment) of the right anterior cerebral artery (ACA), with a

Fig. 1 Preoperative right internal carotid angiograms (left: anteroposterior projection, right: right oblique projection) demonstrating the aneurysm (arrow) arising from the junction of the accessory middle cerebral artery (arrowheads) and the right A_1 segment. The aneurysm is directed inferomedially.

saccular aneurysm arising at the junction of the ACA and the accessory MCA (Figs. 1 and 2). The aneurysm was 3 × 5 mm in size and directed inferomedially. No other aneurysms or vascular anomalies were seen.

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Fig. 2 Three-dimensional computed tomography angiogram demonstrating the aneurysm (arrow) arising from the junction of the accessory middle cerebral artery (arrowheads) and the right A₁ segment. The aneurysm is 3 × 5 mm in size.

Fig. 3 Intraoperative photograph and schematic drawing. arrows: Aneurysm, arrowheads: accessory middle cerebral artery, thick arrows: A₁ segment.

Fig. 4 Postoperative right internal carotid angiograms (left: anteroposterior projection, right: right oblique projection) demonstrating successful clipping of the aneurysm.

Two days after admission (68 hours after onset), a right frontotemporal craniotomy was performed. After opening the sylvian fissure, the ACA and the accessory MCA were exposed. The caliber of the accessory MCA was about half that of the A₁ segment. The A₁ segment and the accessory MCA were traced medially, and the aneurysm neck arising at the junction of the A₁ segment and the accessory MCA was identified. The aneurysm dome was directed inferomedially and had adhered to the right optic nerve and the right frontal lobe (Fig. 3). The neck of the aneurysm was clipped with a Sugita titanium straight clip.

Postoperative angiography confirmed successful exclusion of the aneurysm from the circulation (Fig. 4). The postoperative course was uneventful and he was discharged in good condition. He returned to his job 2 months later.

Discussion

In 1973, Teal et al.¹³⁾ proposed that the term “accessory MCA” should be used for an anomalous artery arising from the horizontal portion of the ACA. His concepts have been widely accepted by other authors.^{2-5,8-12,14,15)} The incidence of the accessory MCA is 0.3% to 2.7% in autopsy series.^{1,7)} The angiographic incidence of accessory MCA is 0.32%.¹⁵⁾

Hemodynamic stress is thought to be an important factor in the development of an aneurysm at the junction of the accessory MCA and the ACA.^{6,10)} The direction of blood flow in the accessory MCA is recurrent to that in the parent vessel, and such recurrent blood flow is likely to result in unusual and high hemodynamic stresses at the arterial junction.^{8,10)}

An aneurysm of the accessory MCA was first

Table 1 Clinical information in 10 patients with accessory middle cerebral artery (MCA) aneurysm

Case No.	Author (Year)	Age, Sex	Presentation	Characteristics of accessory MCA aneurysm				Surgical management		
				Side	Type	Size	Location	Direction	Craniotomy (approach)	Treatment
1	Waga et al. (1977) ^[4]	51, F	SAH	lt	saccular	small	junction *	inferomedial	frontotemporal (ND)	clipping
2	Handa et al. (1982) ^[5]	55, F	SAH	rt	saccular	small	junction *	supramedial	frontotemporal (ND)	clipping
3	Fuwa et al. (1984) ^[2]	57, M	incidental	lt	saccular	small	junction *	supramedial	frontotemporal (ND)	clipping
4	Miyazaki et al. (1984) ^[10]	42, M	SAH	lt	saccular	small?	junction *	inferomedial	frontotemporal (subfrontal?)	clipping
5	Kuwabara and Naitoh (1990) ^[8]	73, F	SAH	rt	saccular	4 × 6 mm	junction *	inferomedial	frontotemporal (subfrontal)	clipping
6	Han et al. (1994) ^[4]	34, F	SAH	lt	saccular	4 × 5 mm	junction *	supramedial	frontotemporal (subfrontal?)	clipping
7	Sugita et al. (1995) ^[12]	53, M	visual disturbance	rt	saccular	giant	junction *	supramedial	bifrontal (interhemispheric)	clipping of aneurysm, trapping of distal A ₁
8	Otawara et al. (1997) ^[11]	66, F	SAH	rt	dissecting aneurysms of accessory MCA and A ₁	ND	trunks of accessory MCA and A ₁	ND	ND (pterional)	wrapping of accessory MCA aneurysm, trapping of A ₁ aneurysm
9	Georgopoulos et al. (1999) ^[3]	32, F	SAH, ICH	lt	saccular	small	trunk	upward	pterional (trans-sylvian)	clipping
10	Present case	30, M	SAH	rt	saccular	3 × 5 mm	junction *	inferomedial	frontotemporal (trans-sylvian)	clipping

* Junction of the accessory MCA and the anterior cerebral artery. ICH: intracerebral hemorrhage, ND: not described, SAH: subarachnoid hemorrhage.

reported in 1977.¹⁴⁾ The current total is only 10 reports, including our own, of patients with an aneurysm of the accessory MCA (Table 1).^{2-5,8,10-12,14)} Eight of these patients, including our own, had a saccular aneurysm arising at the junction of the accessory MCA and the A₁ segment.^{2,4,5,8,10,12,14)} The direction of these aneurysms was inferomedial in four cases and supramedial in four cases.

The dome of an aneurysm of the accessory MCA which is directed inferomedially may adhere to the optic nerve. Retraction of the frontal lobe increases the risk of unexpected bleeding from the aneurysm.¹⁰⁾ The proximal portion of the ACA should be identified prior to the aneurysm neck, so the transylvian approach is the method of choice for aneurysms at the junction of the A₁ segment and the accessory MCA. The interhemispheric approach should be considered for giant aneurysms.¹²⁾

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