



INTRACRANIAL ANEURYSMS IN IDENTICAL TWINS

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BACKGROUND

Though familial intracranial aneurysms are well documented, only a few cases of intracranial aneurysms in identical twins have been reported.

CASE REPORT

Our patient, a 46-year-old woman, presented with a subarachnoid hemorrhage (SAH) due to a ruptured aneurysm. At the age of 36, her identical twin sister had also suffered SAH from a ruptured aneurysm. Both twins were treated successfully.

CONCLUSION

The likelihood of the occurrence of an aneurysm may be higher for a twin whose identical twin has developed an aneurysm than for the general population. Therefore, it is reasonable to perform certain screening procedures for aneurysms on an asymptomatic twin when the other presents with SAH due to a ruptured aneurysm. © 1998 by Elsevier Science Inc.

KEY WORDS

Familial aneurysms, identical twins, subarachnoid hemorrhage

Only seven cases of intracranial aneurysms in identical twins have been reported previously [1,3,5,6-9]. Here we present the eighth case and discuss appropriate management of an asymptomatic twin whose identical twin has presented subarachnoid hemorrhage (SAH) from a ruptured aneurysm.

CASE REPORT

A 46-year-old woman was admitted to Osaka City General Hospital in July 1995 with acute onset of

severe headache and nausea. On admission, she was alert and had no neurological abnormality. A computerized tomography (CT) scan demonstrated SAH. Cerebral angiography revealed an aneurysm at the bifurcation of the left middle cerebral artery (Figure 1). The patient underwent a craniotomy for clipping of the aneurysm on the day of rupture. Neither hydrocephalus nor arterial spasm developed. The patient was discharged from the hospital in August 1995 with no neurological abnormality.

Her identical twin sister had been admitted to another hospital at the age of 36. She was diagnosed with SAH from a ruptured aneurysm of the right middle cerebral artery, for which she underwent clipping. Unfortunately, preoperative cerebral angiography is no longer available. The postoperative cerebral angiography, however, demonstrated a clip at the bifurcation of the right middle cerebral artery (Figure 2).

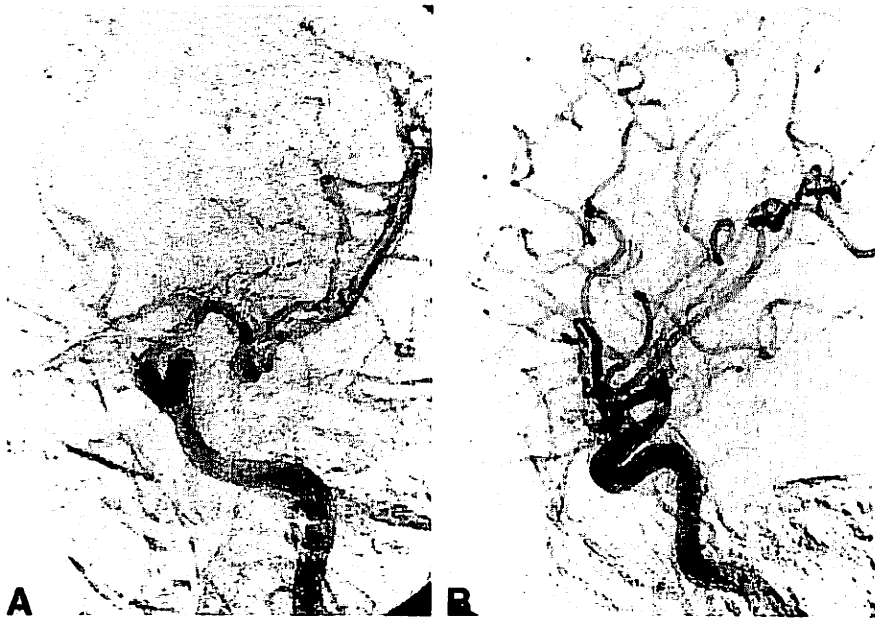
DISCUSSION

Lozano et al reported two cases of familial intracranial aneurysms and summarized 74 cases of familial intracranial aneurysms [4]. He noted that such aneurysms include the following characteristics: they appeared when the twins were of similar ages and, on average, when they were a younger age (mean 39.8 years old) than patients in the general population who present with aneurysms. Familial intracranial aneurysms include a lower proportion of aneurysms of the anterior communicating artery than do aneurysms in the general population. Concerning characteristics of intracranial aneurysms in siblings, Lozano et al noted that they are frequently situated in identical vessels or opposite vessels. Furthermore, such aneurysms in siblings tend to rupture when the siblings are of similar ages.

Including our case, eight cases of intracranial an-

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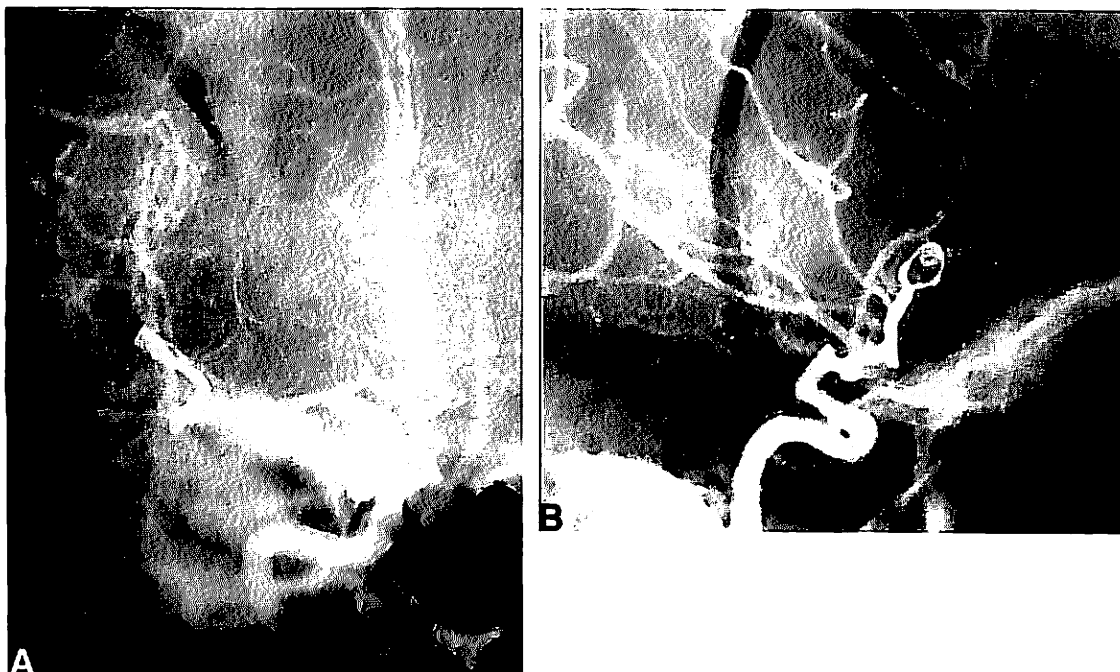
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1 Left carotid angiograms, anteroposterior view (A) and lateral view (B). An aneurysm at the bifurcation of the left middle cerebral artery is shown.

eurysms in identical twins have been reported (Table 1). These aneurysms have presented when the twins were of similar ages and, on average, when they were younger than patients in the general population who present with aneurysms (mean 39.8 years old). SAH from a ruptured aneurysm appeared in 14 of the 16 patients. These aneurysms were frequently situated either in identical vessels (three of eight cases) or in opposite vessels (three

of eight cases) in the pair of twins. O'Brien reported the first case of intracranial aneurysms in identical twins [5]. A 34-year-old man died from SAH due to a ruptured middle cerebral artery aneurysm. At the age of 26, his identical twin died. The cause of death was diagnosed as a brain abscess, but his history indicates that he also had had SAH. Because no postmortem examination was permitted, the cause of death remains unclear. Fairburn reported the



2 Right carotid angiograms, anteroposterior view (A), and lateral view (B). A clip at the bifurcation of the right middle cerebral artery is shown.

1 Summary of Intracranial Aneurysms in Identical Twins

REFERENCE	AGE/SEX	PRESENTATION	SITE
O'Brien, 1942 [5]	26/M	SAH	Not known
Brisman and Abbassioun, 1971 [1]	34/M	SAH	L MCA
	40/F	SAH	L and R MCA
Fairburn, 1973 [3]	44/F	SAH	L and R ICA
	46/F	SAH	R Ophthalmic A
Wilson and Cast, 1973 [9]	42/F	SAH	L Ophthalmic A
	46/F	SAH	L MCA, R PCOMA
Schon and Marshall, 1984 [7]	39/M	SAH	L MCA, R PCOMA
	43/M	SAH	ACOMA
Weil et al, 1988 [8]	43/F	SAH	ACOMA
	43/F	SAH	L and R ICA, L PCOMA, Basilar A
Parekh et al, 1992 [6]	36/F	Headache	L and R ICA, L PCOMA, Basilar A
	37/F	Epilepsy	L MCA, L PICA
This report	36/F	SAH	R MCA
	46/F	SAH	R MCA
		SAH	L MCA

M, male; F, female; L, left; R, right; MCA, middle cerebral artery; ICA, internal carotid artery; Ophthalmic A, ophthalmic artery; PCOMA, posterior communicating artery; ACOMA, anterior communicating artery; Basilar A, basilar artery; PICA, posterior inferior cerebellar artery.

third case [3], in which both of the identical twins had aneurysms at the junction of the internal carotid artery and the ophthalmic artery, an uncommon site for aneurysm formation. Furthermore, the aneurysms had ruptured when the twins were of similar ages (44 and 46 years old). Fairburn therefore presumed that genetic factors played some part in the occurrence of the disease. Brisman et al, Weil et al, and Parekh et al provoked the controversy of screening angiography [1,6,8]. They respectively recommended that cerebral angiography should be carried out on an asymptomatic twin when the other has been discovered to have an aneurysm or has presented with SAH from a ruptured aneurysm.

It has been reported that developmental faults in the arterial wall, atherosclerosis, and hypertension play large parts in the pathogenesis of intracranial aneurysms [2], and that genetic factors, in turn, play a part in the development of these three conditions. Because identical twins are genetically identical, these observations lead us to conclude that the likelihood of the occurrence of an aneurysm may be higher for a twin whose identical twin has developed an aneurysm than for the general population. The characteristics of intracranial aneurysms in families, siblings, and identical twins provide evidence of the influence of genetic factors. Given this evidence of genetic predisposition, it is reasonable to perform screening procedures such as magnetic resonance angiography, three-dimensional CT, and cerebral angiography on an

asymptomatic twin whose identical twin has been discovered to have an aneurysm or has presented with SAH resulting from a ruptured aneurysm. Because intracranial aneurysms in identical twins tend to rupture when the twins are at a similar age, we believe that screening procedures should be carried out at the earliest possible stage. Furthermore, preventive treatment for rupture should be undertaken when an aneurysm is revealed.

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