The de novo formation of aneurysms is a result of the interplay between hemodynamic factors and structural weaknesses, such as congenital or acquired defects, funnel-shaped dilations, and areas of thinning, at apices of arterial bifurcations. Occasionally, de novo aneurysms have been discovered years after successful treatment of aneurysms located elsewhere. Female sex and arterial hypertension are risk factors for this aneurysm formation. We report the case of a 45-year-old woman in whom angiography revealed de novo formation of a left ICA–SHA aneurysm, which ruptured shortly after it developed.

Case Report

History. This 45-year-old nonsmoking woman sought treatment at a clinic on April 28, 2001, for severe headache and vomiting. A CT scan obtained at the time revealed an SAH in the frontal interhemispheric fissure (Fig. 1 left). Cerebral angiography revealed a 5-mm saccular aneurysm of the ACoA, which projected inferiorly and contained a bleb (Fig. 1 center and right). The left CA angiogram revealed normal structures (Fig. 2 left and center). The patient underwent clipping of the aneurysm via a right pterional craniotomy on the same day. During surgery, we decided that the aneurysm had apparently bled; thick clots surrounded the aneurysm bleb, the wall of which was very thin. The left ICA was not visible in the operative field after clipping. The patient’s postoperative course was excellent and she was discharged with no neurological deficit after undergoing cerebral angiography on May 15th. Angiograms obtained at that time demonstrated complete clipping of the aneurysm and no evidence of another aneurysm (Fig. 2 right). After discharge, the patient’s systolic blood pressure was 170 mm Hg, although antihypertension drugs had been administered.

Examination. On June 29, 2001, 47 days after the patient had undergone angiography, she was admitted to our clinic with severe headache and vomiting. Neurological examination yielded normal findings, with the exception of moderate neck stiffness. A CT scan revealed SAH with diffuse bleeding into the basal cisterns and mild hydrocephalus (Fig. 3 left). Cerebral angiograms (Fig. 3 center and right) revealed a 7-mm saccular aneurysm, originating from the ophthalmic segment of the left ICA and projecting medially. This information suggested the presence of an ICA–SHA aneurysm. The left posterior communicating artery could not be detected. There was no evidence of a repeated rupture at the site of the previous clipping.

Operation. The patient underwent clipping of the new aneurysm through a left pterional craniotomy on the same day. After the anterior clinoid process had been removed, the saccular aneurysm, which projected medially and contained a bleb at the superomedial wall, was found together with thick blood clots under the optic chiasm (Fig. 4). The presence of the left ophthalmic artery was confirmed at its extradural origin and the tiny SHA, arising just proximal to the aneurysm neck on the ophthalmic segment, was found to course to the ventral surface of the optic chiasm. The de novo aneurysm was separated from the clip of the original ACoA aneurysm by at least 5 mm. After we completed dis-
section around the neck of the aneurysm, we used a straight Sugita clip to secure the lesion, thus allowing good patency of the left ICA. The tiny SHA was sacrificed before the aneurysm was clipped.

Postoperative Course. The patient’s postoperative course was uneventful and cerebral angiography, which was performed on July 5th, revealed no residual aneurysm (Fig. 5). Although the patient’s hypertension was difficult to control, normal blood pressure was achieved and maintained by an increase in the patient’s dose of antihypertension drugs, a low-salt diet, and moderate exercise. The patient was discharged without neurological deficits on the 18th postoperative day.

Discussion

The interval between a first SAH caused by one aneurysm and the onset of symptoms from the rupture of a de novo aneurysm has been discussed by several authors. Tonn and colleagues collected 49 cases in which de novo formation of intracranial aneurysms occurred. The mean interval between aneurysms was 9.9 ± 6.7 years (range 3–34 years). In 44% of the cases, however, the newly formed aneurysm became symptomatic in 3 to 6 years after the first treatment and, in patients with hypertension, this interval was significantly shorter. Maiuri, et al., reviewed 33 cases of de novo aneurysms, noting that the interval between the first operation and the diagnosis of the de novo aneurysm ranged from 2 to 20 years (mean 8 years). In a previous report the shortest interval for de novo formation and rupture of an aneurysm was 2 years, although in that case the CA had been ligated. In a report of the results of a long-term follow-up study of 130 patients who had harbored 161 unruptured aneurysms, Wiebers and colleagues suggested that most aneurysms rupture at the time of or soon after their formation. In our patient, the interval between the last angiographic study, performed at the first operation, and the diagnosis of the de novo aneurysm was 47 days. Our case supports the reports that some aneurysms do rupture at, or soon after, their formation. The cumulative rate of aneurysm rupture has been reported to be less than 0.05%/year, but much controversy has arisen concerning that report. The existence of aneurysms that do rupture at the time of, or soon after, their formation, requires neurosurgeons to review the report.

Whether a de novo aneurysm is really new or is already

Fig. 1. **Left**: A CT scan obtained on April 29, 2001, revealing SAH in the frontal interhemispheric fissure. **Center** and **Right**: Right CA angiograms (anteroposterior [center] and lateral [right] views) demonstrating an ACoA aneurysm (arrows), which projects inferiorly and contains a bleb on the lateral wall (arrowhead).

Fig. 2. **Left** and **Center**: Left CA angiograms obtained on April 29, 2001 (anteroposterior [left] and lateral [center] views) demonstrating no evidence of an aneurysm (arrows). **Right**: Right angiogram with CA compression obtained on May 15, 2001, confirming complete clipping of the aneurysm (arrowhead).
De novo aneurysm of the superior hypophyseal artery

Fig. 3. Left: A CT scan obtained on June 29, 2001, revealing SAH with diffuse bleeding into the basal cisterns and mild hydrocephalus. Center and Right: Left CA angiograms (anteroposterior [center] and lateral [right] views) demonstrating an aneurysm of the ophthalmic segment of the ICA, which projects medially (arrows).

Fig. 4. Intraoperative photograph (left) and corresponding drawing (right) showing the operative view after the left anterior clinoid process had been removed. The ICA–SHA aneurysm extends beneath the optic nerve ([ON]; arrow in left panel) and thick clots surround the bleb of the aneurysm (arrowheads).
shown in our case and in the report by Wiebers, et al., which suggest that some aneurysms rupture at the time of, or soon after, their formation.

In general, the contributory effects of smoking, use of oral contraceptives, and arterial hypertension on degenerative changes in cerebral arteries seem to be important for aneurysm formation. Juvela and associates have estimated that women and persons who smoke cigarettes are at an increased risk of formation and growth of intracranial aneurysms. Our patient did not have any of the systemic diseases associated with hypertension, such as hyperaldosteronism, pheochromocytoma, hyperthyroidism, or hypertrophic cardiomyopathy. She also did not have systemic diseases associated with multiple aneurysms, such as polycystic kidney disease, neurofibromatosis Type 1, Marfan syndrome, or fibromuscular dysplasia. Despite our patient’s sex and arterial hypertension, the remarkably short interval between the first SAH and the onset of symptoms due to rupture of the de novo aneurysm cannot be explained. The fundamental factor that may prevent the development of another de novo aneurysm in this patient appears to be long-term control of her blood pressure.

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