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Aneurysm

Aneurysmal embolization of a blisterlike aneurysm of the internal carotid artery: a case report and review of the literature

Yasuyuki Ezaki, MD*, Hideaki Takahata, MD, Kensaku Kamada, MD, Shiro Baba, MD, Makio Kaminogo, MD

Department of Neurosurgery, Sasebo City General Hospital, Sasebo City 857-8511, Japan

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Abstract

Background: Little is known regarding the optimal management of a ruptured blisterlike aneurysm of the ICA. Because of the high risk for intraoperative bleeding, direct surgical treatments of these fragile lesions have generally been associated with a poor outcome. We herein report a very rare case of a ruptured blisterlike aneurysm that was successfully treated with coil embolization in the late period.

Case Description: The patient was 21 years old when he had a Hunt and Hess grade IV subarachnoid hemorrhage. At the time of the hemorrhage, 3D-CTA demonstrated a minimal aneurysmal enlargement located in the left C2 portion of the ICA. Because of his poor neurological condition and the risk for a premature rupture during early surgery, delayed surgery was thus scheduled. Cerebral angiography, 13 days later, revealed the shape and size of the aneurysm to have changed in form from a blisterlike aneurysm to a saccular-type one. Initially, we planned to treat the aneurysm by trapping with bypass surgery on the 15th day. However, we instead performed coil embolization on the 19th day because a thick thrombus was found to cover the aneurysm at the time of surgery on the 15th day.

Conclusion: This is the first report of a ruptured blisterlike aneurysm that was successfully treated with coil embolization in the late period of a subarachnoid hemorrhage after operative confirmation of thrombus formation around the aneurysm. Our findings suggest that coil embolization in the late period appears to be an effective option in the management of selective cases of ruptured blisterlike aneurysms.

Keywords: Blisterlike aneurysm; Coil embolization; Internal carotid artery

1. Introduction

Blisterlike aneurysms of the supraclinoid ICA have recently been recognized as having unique pathological and clinical features. These are rare types of aneurysms, which have been found to comprise 0.9% to 6.5% of all ICA aneurysms [4]. It is important to recognize this type of aneurysm because of their very fragile nature, high rate of intraoperative and postoperative bleeding, and tendency to progress in size over a short period. Various surgical and endovascular approaches have been described for the treatment of blisterlike aneurysms. However, the optimal treatment strategy remains to be elucidated. To our knowledge, there were few cases of blisterlike aneurysms treated by a GDC. We herein report the case of a blisterlike aneurysm of the ICA treated with GDC embolization on the 19th day of subarachnoid hemorrhage. In addition, the clinical features as well as the therapeutic difficulties in other such cases are also reviewed.

2. Case report

A 21-year-old man experienced a sudden onset of a severe headache while he was working. Because of a gradual deterioration of consciousness, he was brought to

Abbreviations: 3D-CTA, 3-dimensional computed tomographic angiography; CT, computed tomography; GDC, Guglielmi detachable coil; ICA, internal carotid artery.

* Corresponding author. Tel.: +81 956 24 1515; fax: +81 956 22 4641.
E-mail address: ezaki-nsu@umin.ac.jp (Y. Ezaki).

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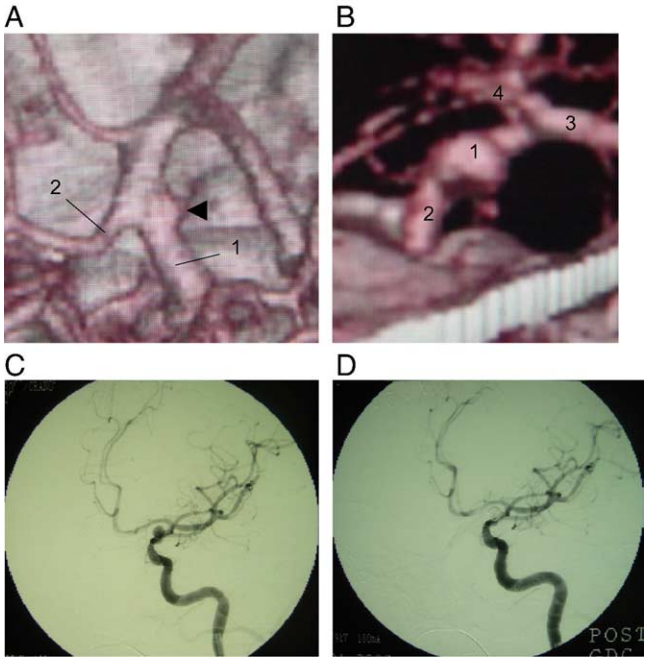

Fig. 1. A: On admission, 3D-CTA in the right oblique projection demonstrated a minimal aneurysmal enlargement (arrowhead) located in the left C2 portion of the ICA. Number 1 indicates ICA; 2, posterior communicating artery. B: Follow-up 3D-CTA in the anteroposterior projection demonstrated a significant growth of the left ICA aneurysm. Number 1 indicates aneurysm; 2, ICA; 3, middle cerebral artery; 4, anterior cerebral artery. C: A left oblique carotid angiogram showing a saccular aneurysm of the supraclinoid ICA on the 13th day. D: A left oblique carotid angiogram taken immediately after coil embolization demonstrating the complete occlusion of the aneurysm.

the emergency department of our hospital. The patient presented with unconsciousness but no other neurological deficits. His condition was graded Hunt and Hess grade IV. His medical history was unremarkable other than mental deterioration and no particular medication history. His family history was negative for cerebrovascular disease. CT revealed a diffuse subarachnoid hemorrhage (Fisher group 3). 3D-CTA after conventional CT showed a broad-based small bulge in the superomedial wall of the left ICA, and no other aneurysms were detected (Fig. 1A). We thought that a blisterlike aneurysm of distal ICA was the cause of the subarachnoid hemorrhage. Because of the patient's poor clinical condition and the risk for a premature rupture during early surgery, the patient was treated conservatively and delayed surgery was scheduled. For the next 2 weeks, he experienced transient right mild hemiparesis due to vasospasm.

On the 13th day after the onset of the hemorrhage, when his condition had stabilized and he had also neurologically improved, 3D-CTA was again performed and a remarkable growth of the aneurysm was observed in the C2 portion of the left ICA, which arose from the anteromedial wall of the artery (Fig 1B). Cerebral angiography also demonstrated a growth of the saccular-like aneurysm instead of a blisterlike configuration in the left ICA (Fig 1C). The trapping of the aneurysm with a superficial temporal artery–middle cerebral artery bypass was tried on the 15th day after onset. The cervical ICA was exposed for proximal control in case of a premature rupture after a superficial temporal artery–middle cerebral artery bypass procedure. The sylvian fissure was opened widely, and the left frontal lobe was carefully elevated to approach the ICA. There was no evidence of atherosclerosis in the ICA. The left ICA distal to the aneurysm was exposed. With clearing adhesions to the surrounding tissue, we approached the distal neck of the aneurysm and found that the aneurysm was entirely covered with a thick thrombus. We therefore concluded that the aneurysm could be treated by endovascular coiling without the rupture of aneurysmal wall. The patient underwent GDC embolization without any problems on the 19th day (Fig 1D). No neurological deficit developed after the endovascular surgery, and his neurological symptoms thereafter gradually improved. One month after endovascular coiling, follow-up angiography revealed a complete embolization of the aneurysm with the preservation of left ICA. The patient showed a good course and returned home 1 week after follow-up angiography. The patient's Glasgow Outcome Scale was a moderate disability at the time of discharge. Further angiographic follow-up studies are planned after half a year.

3. Discussion

Generally, blisterlike aneurysms are rare, representing only 0.9% to 6.5% of all ICA aneurysms [4]. In addition, such aneurysms tend to have a worse prognosis than other aneurysms because they are fragile and often rupture prematurely during surgical exposure, thus resulting in a higher morbidity. In previous reports, various surgical procedures have been described for the treatment of such aneurysms [1,4]. The optimal treatment method is the application of a clip, with the clip blades parallel to the parent artery to catch the arterial wall beyond the lesion either with or without wrapping [4]. However, the wall of blisterlike aneurysms is extremely thin and fragile, with a marked tendency to rupture at the neck of aneurysm during surgical treatment. Proximal occlusion of ICA or trapping of the aneurysm is another treatment option [2]. However, even if bypass surgery is additionally performed, these methods have a potential risk for causing ischemic complications.

Blisterlike ICA aneurysms treated by coiling are extremely rare because of the following characteristics: (1) because of the fragile wall of the aneurysm, there is the risk for penetration of coils into the aneurysm; and (2) morphologically, the aneurysm is too small but has a broad neck, and thus, it is difficult to place coils in the cavity. There are only 2 reported cases, in which the blisterlike aneurysms have progressed in size to develop a saccular appearance over a short period, successfully treated by coil embolization [3,6]. Tanoue et al [6] treated a

blisterlike aneurysm of ICA by endovascular coiling alone on the 40th day after hemorrhage. McNeely et al [3] at first performed surgical wrapping of the unclippable aneurysm on the third day after hemorrhage because of a small bulge in the medial wall of the distal ICA. However, repeat angiography showed a remarkable growth in the saccular configuration of the aneurysm, and additional endovascular coiling was performed twice on the 10th day and 3 months after onset. In these 2 cases reported, the aneurysm was treated by endovascular coiling in the chronic period. Although preoperative evaluations of the surrounding condition of the aneurysms were not performed in addition to angiography in these 2 cases, the walls of the aneurysms might have been no more fragile because of the surrounding thrombus formation.

In our case, we first tried to perform trapping of the aneurysm with bypass surgery in the late period because we thought that the aneurysmal wall was too fragile. However, we realized that the aneurysm was entirely covered with thick thrombus and concluded that coil embolization could be done without rupture of wall. The present case indicated the importance of preoperative evaluation for the thrombus formation surrounding the aneurysm. In our case, the retrospective findings of CT before coiling suggested the presence of thrombus as a low-isodensity lesion. Magnetic resonance imaging seems to be superior to CT for evaluating the characteristics of aneurysms, although it was not used in our case.

In several reports [1,5], the rapid growth of blisterlike aneurysms until they demonstrate a saccular appearance over a short period has been described. In such cases, the aneurysmal wall might be covered with a thick thrombus and coil embolization can be done with a low risk for rupture in the late period of subarachnoid hemorrhage. In cases of blisterlike aneurysms with a high risk for open surgery, we recommend that surgeons carefully evaluate not only the internal shape on angiograms and 3D-CTA, but also the outer shape of such aneurysms as demonstrated by CT or magnetic resonance imaging because thrombus covering aneurysms, as seen in our case, might be encountered. Although the long-term results of coiling for blisterlike aneurysms are still uncertain, this preliminary experience suggests that coil embolization in the late stage of ICA blisterlike aneurysms covered with thick thrombus therefore appears to be a potentially effective treatment alternative to standard surgical procedures.

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Commentary

A blisterlike aneurysm is not coilable, but this one ruptured and became spherical and coilable. The fragility of the wall of this false aneurysm was not an issue because a thick clot was found at surgery. This is a unique case.

Gerard Debrun, MD
Interventional Neuroradiologist
Paris 29360, France