Distal choroidal artery aneurysms are rare and are mostly associated with moyamoya disease; when treated, the most common procedure is open neurosurgery. We report the first case in which a distal choroidal artery aneurysm was treated by endoscopy.

**Case Report**

**History.** This 50-year-old woman presented with a sudden onset of severe headache associated with vomiting and a decreased level of consciousness. Ten years previously she had been admitted for a right occipitoparietal hemorrhage as a result of moyamoya disease. One month before the current presentation, she was readmitted for a left ventricular hemorrhage. Angiography at that time revealed a 6-mm BA aneurysm as well as typical findings of moyamoya disease. Although the BA aneurysm was not thought to be responsible for the intraventricular hemorrhage, it was embolized because of its location and the patient’s age. Two weeks later follow-up angiography showed that the basilar tip aneurysm was completely excluded. Five days after this angiography session, the patient was found to be drowsy. Neurological examination revealed a mild decreased level of consciousness as well as a right superior quadrantanopia due to the previous occipitoparietal hemorrhage. The patient’s blood pressure was 180/100 mm Hg. Laboratory data indicated no evidence of a hematological disorder or infectious process. Computed tomography scanning revealed an intraventricular hemorrhage without subarachnoid hemorrhage, mainly in the left lateral ventricle at the same location as the hemorrhage 1 month previously (Fig. 1). There was no hydrocephalus. Axial T2-weighted MR imaging revealed a small signal void adjacent to the lateral wall of the trigone of the left lateral ventricle, suggestive of an aneurysm (Fig. 2). Angiography demonstrated a 7-mm aneurysm from the distal portion of the left AChoA (Fig. 3). The previous angiogram had not shown this anomaly. Because of the recurrence of the hemorrhage and because this aneurysm was not suitable for an endovascular treatment, an endoscopic approach was proposed after the resorption of the intraventricular blood.

**Endoscopic Technique.** After induction of general anesthesia, the patient was placed in the prone position with her head fixed in a Mayfield clamp. Using an MR imaging-guided system, entry and target points were...
selected by determining a linear trajectory through the scalp (entry point) leading to the left atrium (target). A rigid 2-mm-diameter, 0° angle, and 26-cm-long neuroendoscope was introduced into the atrium. The choroid plexus was identified and found to be normal, apart from a few mild prominent vessels. Inspection of the left atrium revealed the aneurysm protruding from the lateral wall of the trigone. It was possible to displace the aneurysm with the endoscope, permitting the identification of the tiny parent vessel originating from the ependymal wall. Using the semiflexible electrode (unipolar, semirigid, diameter 1.3 mm, working length 30 cm), the pedicle and the

parent artery were coagulated and then incised, allowing complete resection of the aneurysm. Care was taken not to injure the thalamocaudate vein (Fig. 4).

**Histological Examination.** The wall of the aneurysm consisted of intimal endothelial cells, a thickened media replaced by fibrous tissue, and an adventitial layer. The internal elastic lamina was absent. These findings are consistent with an aneurysm (Fig. 5).

**Postoperative Course.** The patient had an uneventful postoperative course. Postoperative MR imaging indicated complete excision of the aneurysm (Fig. 6).

**Discussion**

Distal choroidal artery aneurysms are rare. They are mainly associated with moyamoya disease, but they can also be found in association with arteriovenous malformations, atherosclerosis, and sometimes without any vascular anomaly. These aneurysms may originate from a branch of the AChoA or less frequently from the lateral posterior choroidal artery. Because of their distal location, it may, on occasion, be difficult to determine the pre-
cise parent artery. In the present case, angiography suggested that the aneurysm originated from a distal branch of the left AChoA. However, angiography and MR imaging revealed that the aneurysm was against the lateral wall of the atrium, which is commonly vascularized by subependymal branches of the lateral posterior choroidal artery and less frequently by branches of the AChoA.6

In the present case, as well as in other reported cases, the aneurysm could not be initially seen by angiography.7 The initial negative angiogram was probably due to the small size of the aneurysm. In addition, overlapping branches of adjacent vessels can sometimes hinder recognition of distal segments of the choroidal arteries. For this reason it is recommended that angiography be repeated following intraventricular hemorrhage, especially in the presence of moyamoya disease.3

Spontaneous regression of distal aneurysms associated with moyamoya disease, especially in the basal ganglia or on the collateral vessels, has sometimes been observed on follow-up angiography. Nonetheless, given the high risk of rebleeding from these aneurysms, exclusion is recommended.1,5

Until now, for patients with such aneurysms, the options were open surgery and, in a few cases, endovascular treatment.3 Surgical approaches to the atrium of the lateral ventricle remain a challenge especially in the absence of hydrocephalus. The different approaches described have inherent complications in proportion to the extent of the dissection and cortical retraction. Contrary to proximal saccular berry aneurysms, preservation of the parent artery is not a concern in such distal aneurysms. Despite the steady progress in the endoscopic treatment of intraventricular lesions, endoscopic treatment of an intraventricular aneurysm has never been reported.2 Although there have been some reports of endoscopy-assisted aneurysm surgery, to our knowledge only one case of saccular aneurysm has been successfully treated by a purely endoscopic endonasal approach.4 Endoscopy has the advantage of providing superior visualization, coupled with minimal brain retraction. Aided by the MR imaging–guided system, the entry point was accurately localized and the trajectory was straightforward, eliminating unnecessary exploration. In the event of an intraoperative rupture, gentle pressure applied to the parent artery and its bipolar coagulation should be sufficient to stop the bleeding, which is unlikely to be profuse coming from such a tiny

Fig. 4. Neuroendoscopic images. A and B: Aneurysm protruding from the lateral wall of the trigone. C: View of the tiny parent vessel.

Fig. 5. Photomicrographs of the excised aneurysm. A: Vascular structure showing a thickened wall consisting of a media replaced by fibrous tissue and an adventitial layer. H & E, original magnification × 25. B: Vascular wall showing fragmented or absent lamina elastica in multiple sites. Glial fibrillary acidic protein immunoperoxidase, original magnification × 100.

Fig. 6. Postoperative axial T2-weighted MR image demonstrating excision of the aneurysm.
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artery. The management is otherwise similar to that of an intraventricular hemorrhage occurring during a regular ventricular endoscopy.

Conclusions

This is the first report of a distal AChoA treated by endoscopy. This approach may be a viable option in the treatment of intraventricular hemorrhage due to distal choroidal aneurysm rupture. The technique may allow treatment of such deep lesions with the least amount of dissection, brain retraction, and operative exposure.

Disclaimer

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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References


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