Ruptured aneurysm at the anterior cerebral artery fenestration

Case report

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Fenestration of the anterior cerebral artery is rare. We present the case of a patient who presented with a ruptured aneurysm arising from the proximal end of a fenestration of the anterior cerebral artery. The lesion was demonstrated by angiography and confirmed at surgery.

KEY WORDS: cerebral aneurysm • cerebral arteries • subarachnoid hemorrhage • anterior cerebral artery

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Case Report

This 43-year-old man suddenly developed severe headache on February 26, 1980, followed by gradual development of stupor.

Examination. On admission on February 27, the significant findings were hemorrhage in the right ocular fundus and stiffness of the neck. Computerized tomography revealed high-density areas in the suprasellar and bilateral Sylvian cisterns, protruding into the right frontal lobe (Fig. 1 left). Angiography demonstrated a fenestration in the A1 portion of the right ACA, and an aneurysm arising at the proximal end (Fig. 1 right). On the basis of the above findings, the diagnosis of rupture of the right ACA aneurysm was made.

Operation. On the day of admission, right frontotemporal craniotomy was performed. A ventricular drainage tube was inserted. The A1 portion of the right ACA was dissected from the right internal carotid artery, and the fenestration and aneurysm were confirmed. The neck of the aneurysm was clipped and as much of the hematoma in the area as possible was removed.

Postoperative Course. The patient's state of consciousness diminished from the 7th day after onset. Angiography showed complete obliteration of the aneurysm, but indicated vasospasm of the bilateral anterior and middle cerebral arteries. Despite external decompression and ventricular drainage, he lapsed into a vegetative state, and finally died on May 1, 1981, without regaining consciousness.

Postmortem Examination. Macroscopic examination showed a clipped aneurysm at the site of fenestration in the A1 portion of the right ACA (Fig. 2). Microscopically, medial defects were noted in the neck and dome of the aneurysm.

Discussion

Fenestrations are observed on 0.3% to 0.9% of cerebral angiograms, and are reported to be frequently demonstrated in the vertebral and basilar arteries. However, only 38 cases of fenestration in the ACA (all in the A1 portion) have been reported in the literature: 33 of these were confirmed by autopsy and five by angiography. Fenestration aneurysms in the basilar artery have been reported in one autopsy case, and two were found by angiography and surgery. Only one such aneurysm has been found in the ACA on autopsy by Crompton.
Aneurysm of anterior cerebral artery fenestration

FIG. 1. Findings at time of admission. Left: Computerized tomography scan showing a high-density area at the suprasellar and bilateral Sylvian cistern. A portion of the high-density area (arrow) protrudes into the right frontal lobe. Right: Right carotid angiogram showing the fenestration (open arrowheads) at the A1 portion of the right anterior cerebral artery (solid arrowheads), and the aneurysm (arrow) arising from the proximal end.

According to Padget,11 at about ovulation (age 29 days), the distal end forms the cranial and caudal divisions of the internal carotid artery. At 32 days, the cranial division of the internal carotid artery gives rise to the primitive anterior choroidal artery and the middle cerebral stem, and terminates at the olfactory pit, but gives off small branches medially at that time. These small branches fuse at about 35 days to form the ACA. Teal, et al.,12 offer the following possible explanations for the development of fenestrations in the internal carotid system, such as the ACA: true partial duplication, incomplete fusion of a precursor vascular network, or incorporation of a nerve within a specific artery.

Crompton2 observed in autopsy cases medial defects at the proximal ends of three arterial fenestrations, that is, the middle cerebral artery, anterior cerebral artery, and basilar artery. In his last two cases and in our case, an aneurysm was also present in the proximal end, and medial defects were noted in the aneurysm. Therefore, although it is thought that a hemodynamic factor as described by Ferguson3 is involved in the development of the fenestration aneurysm of the ACA, the primary cause is considered to be the medial defect in the proximal end.

To our knowledge, the case presented here is the first report on a patient with a ruptured aneurysm at an ACA fenestration confirmed by both angiography and operation.

FIG. 2. Diagram of the fenestration of the anterior cerebral artery (ACA) and the aneurysm. ICA = internal carotid artery.

References

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