Intracranial Saccular Aneurysm Unrelated to Bifurcations

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With 5 Figures

Summary

Based on the histological findings in the intracranial arterial system of a patient with anterior cerebral artery aneurysms unrelated to bifurcations, the authors assume that such aneurysms may develop from media gaps having their origin in a special kind of multifocal media degeneration unassociated with arteriosclerotic, inflammatory, or infectious processes.

Keywords: Cerebral aneurysms, anterior cerebral aneurysms; histology of; formation of; multifocal media degeneration.

Saccular aneurysms of the intracranial arteries arise mainly at bifurcations. Only a few are not associated with sites of branching. In general, they occur on the cavernous segment of the internal carotid artery, on the basilar and vertebral arteries, and on the distal portions of the anterior cerebral arteries.

While the formation of aneurysms directly related to arterial bifurcations is fairly well-known (they develop from apical media gaps with a disintegrated internal elastic layer, by extension of the adventitia covering them), there is no generally accepted idea as to how those unrelated to branching sites are formed.

The present paper deals with the peculiar histological findings in a patient with anterior cerebral artery aneurysms unrelated to bifurcations, suggesting a new concept of the formation of this type of aneurysm.

Case Report

A 50-year-old female lost consciousness at her home on the day of admission to the Department of Neurology and Psychiatry of the University of Pécs Medical School. On physical examination, lack of initiative, meningeal signs, increased deep reflexes on both sides but with a dominance on the right, patchy bleeding
in the fundi of the eyes, and fairly high blood pressure (190/120 mm Hg) were found. The cerebrospinal fluid was massively bloody. Percutaneous angiography of the left common carotid artery revealed two saccular aneurysms on the distal segment of the left anterior cerebral artery. During transportation to the Department of Neurosurgery her condition suddenly deteriorated, with clinical signs suggesting pulmonary embolisation. Total hemiparesis developed on the right side. She lost consciousness, and remained comatose until her death on the 35th day after the first attack.

At autopsy, partial pulmonary embolism, a haemorrhagic pulmonary infarct, deep crural vein thrombosis, and fatty degeneration in the heart muscle, liver, and kidneys were found. The base of the brain, especially in the vicinity of the optic nerves was brownish-yellow. In the interhemispheric fissure, a torpedo-shaped aneurysm 10 mm in length and 4–5 mm in diameter (Fig. 1), arising from the left anterior cerebral artery 25 mm distal to the anterior communicating artery, and a nut-sized, organized thrombus located more distally on the same artery were found. The latter could hardly be separated from the brain. It covered a ruptured aneurysm. Under the preparation microscope a bulge with a thin transparent wall was seen on the right anterior cerebral artery at about the level of the torpedo-shaped unruptured aneurysm.

Material and Methods

After removal of the brain and ligature of one of the vertebral arteries and both internal carotid arteries, the intracranial arterial system was fixed by perfusion through the other vertebral artery with 4% formalin at 130 mm Hg for