Radiological Demonstration of Rupture of a Carotid Aneurysm During Cerebral Angiography

Case Report

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That cerebral arteriography can carry certain hazards has been repeatedly recognized.3,10,12,14,15 The complications are usually due to the trauma of puncturing the vessel, the toxic action of the contrast medium itself, or hydrodynamic disturbances.

The rupture of an intracranial aneurysm during an arteriographic procedure has seldom been visualized radiographically.1,9,11,17

The case we are reporting is the only one observed in the last 10 years among the many carotid arteriographies performed in the Radiological Department of the Institutes of Neurosurgery and Neurology of the University of Padua and the Institute of Neurology of the University of Cagliari.

Case Report

This 38-year-old woman had always been in perfect health until 1957 when she contracted typhoid fever; at the same time she started having fits that recurred once every 4 to 10 months and were characterized by vertigo, sweating, and sudden loss of consciousness. Headache and drowsiness were a constant aftermath. The most recent seizure took place 4 days before admission in 1967 and was marked by especially severe headache and repeated vomiting. The patient had never been studied or treated.

Examination. On admission on July 31, 1967, the patient showed slight increase of the tendon reflexes on the right side, moderate anisochoria (left side greater than right), and left anosmia. Urine examination and routine blood tests were negative. X-ray films of the skull were normal with the exception of a faint pea-sized opacity which in the lateral view coincided with the anterior clinoid process and in the anteroposterior view was located to the left of these processes. The electroencephalogram showed moderate irritative abnormalities in the anterior and middle left temporal leads.

Angiography. We considered suprasellar meningioma as a possible diagnosis, and left carotid angiography was performed using Conray 60%. The patient showed no unfavorable reactions to two consecutive 8 ml doses, but at the end of a third dose became unconscious, with deviation of the head and eyes to the left, apnea, hypotension, and increased pulse rate. These symptoms were caused by extravasation of the contrast medium from the aneurysm into the subarachnoid space, which was fully documented by Figs. 1 and 2. After cessation of the tonic phase, respiration started again, at first periodic, then normal. The patient was comatose with loss of tendon reflexes; there were bilateral Babinski's signs and anisochoria (right side greater than the left).

In the following days consciousness gradually returned. There was, however, a right hemiplegia and aphasia. In the left fundus oculi, there were hemorrhages around the papilla. Seven months after admission the patient still had flaccid hemiplegia but was able to pronounce some words, although not fluently. The electroencephalogram then showed almost complete absence of cortical activity on the left side.

Discussion

The rupture of an intracranial aneurysm during carotid or vertebral angiography is a rare but possible occurrence. In most cases of subarachnoid hemorrhage, however, angiographic procedures are necessary to diagnose the precise anatomical conditions underlying the hemorrhage8 or to clarify a doubtful case such as our own, in which a meningioma was suspected. Decker says, in fact, that a calcification in the wall of an aneurysm is quite rare.8

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We are discussing this case to evaluate the possible factors in the rupture of the aneurysm during angiography and to eliminate the easy explanation of an accidental relationship between two coincidental occurrences. Lacking precise measurable anatomic evidence and data because of the dramatic suddenness of the accident, we must make a circumstantial deduction based on previous experience.

The contrast medium used (Conray 60%) is considered one of the safest for cerebral angiography. The technique was the same we had followed in several thousand other carotid or vertebral angiographies with no major complications. The common carotid artery was punctured percutaneously; during each injection, 8 cc of contrast medium were introduced by manual pressure over a period of 2 to 3 seconds. Pressure was not applied to the contralateral carotid; this, if prolonged, leads to a considerable in-
crease in the systolic pressure. The patient was a young woman with a normal heart and no arteriosclerosis.

In uncomplicated angiography the lack of precise information concerning the time elapsed between arteriography and hemorrhage makes difficult any estimation of the risk of angiographic procedures performed too quickly. The number of injections and the briefness of the intervals between them might be important in determining the complications. Törma and Fogelholm tend to minimize these factors. Most cases of rupture of aneurysm during angiography, however, received doses of contrast medium and a number of injections higher than those required for a normal procedure. Broman and Olsson believe that a summation effect might develop if the injections are given too close to each other. As far as Diodrast is concerned, the reaction with the vascular wall was directly related to the concentration of the contrast medium and the duration of its contact with the endothelial lining. Chemical toxic action on the vascular walls demonstrated for Urokon 70% and Diodrast cannot be ruled out in the case of Conray 60%. In our patient, retention of the contrast medium in the sac for a relatively long time could have damaged the aneurysmal wall which was undergoing reparative phenomena.

At the same time, the contrast medium caused segmental spasm of the vessels, also shown in the radiographs. We consider it a reasonable hypothesis that these segmental contractions and the accompanying hemodynamic imbalance, with local pressure increase and possible formation of a functional valve mechanism, might have resulted in an increase of pressure within the aneurysm leading to its rupture.

Summary

A case of rupture of an intracranial aneurysm during carotid arteriography has been reported. The patient, a 38-year-old woman, survived but still has severe aphasia and flaccid hemiplegia 7 months later.

The possible factors in the production of this infrequent complication have been discussed with a special emphasis on the chemical toxic action by the contrast medium on the wall of the aneurysm, and hemodynamic imbalance with segmental increase in the intraluminal pressure.

References