Multiple Cerebral Aneurysms in a Patient with an Abdominal Aortic Aneurysm

Report of a Case*

MATTHEW T. MOORE, M.D.
University of Pennsylvania Graduate Hospital and School of Medicine, Philadelphia, Pennsylvania

Intracranial aneurysms, single or multiple, may exist together with an aneurysm elsewhere in the body but a review of the literature has failed to uncover any recorded cases, such as this, of multiple cerebral aneurysms in association with an abdominal aortic aneurysm. That such cases can and will occur may be predicted by the law of chance and anticipated because of the contemporary refinements of diagnostic methods. The experiences in the following case report are recorded with the hope that they might provide a guide in the conduct of a similar case.

Case Report

A 56-year-old right-handed male was admitted to the Graduate Hospital of the University of Pennsylvania, January 4, 1954, with the history of abrupt onset of severe, continuous blinding headache the day before, which was not relieved by oral analgesics or narcotics. Data in the family and past medical history bore no relevance to the presenting symptoms and signs.

Physical examination disclosed an adult male in full possession of his mental faculties, obviously experiencing intense headache. The positive neurological findings consisted of impaired convergence and upward gaze of the eyes, extreme nuchal rigidity, and Kernig and Brudzinski test. The general somatic examination revealed nothing abnormal except a loud, grating, apical systolic murmur transmitted to the left axilla. The blood pressure was 150/80; pulse, 80; respirations, 20. Blood count, urinalysis and blood chemistry were normal and the blood serology was non-reactive.

The admission diagnosis of spontaneous subarachnoid hemorrhage stemming from a leaking aneurysm was confirmed by the presence of grossly bloody cerebrospinal fluid. Radiographs of the skull were normal and those of the chest showed hazy densities in both apices of the lungs. On January 8, right cerebral arteriography demonstrated a moderately large aneurysm arising from the carotid siphon just at its confluence with the right middle cerebral artery (Fig. 1). Arteriography of the left side, done January 11, showed a normal vascular pattern (Fig. 2). The right common carotid artery was ligated on January 12 by Dr. Robert A. Groff. There were no postoperative complications and the patient was discharged January 18 to return in February for ligation of the right internal carotid artery.

2nd Admission. During the ensuing 2 weeks he experienced occasional headache, fleeting numbness of the left arm and slight weakness of the left hand. He was readmitted on February 8, 1954, and on February 9, the right internal carotid artery was ligated under general anaesthesia. There were no postoperative motor or sensory deficits and after a few days of febrile reaction, which responded promptly to crysticillin, he was discharged on February 15. He continued to have periodic headaches which were relieved by aspirin. Neurological examination showed increased biceps and triceps tendon reflexes on the left as compared with the right. The patient returned to work on a part-time basis in March and on a full-day schedule during the middle of April.

He had intermittent headache through the remainder of 1954 and 1955 but continued to work steadily. On August 4, 1956, he again had a severe suboccipital headache. Two days bed rest provided relief and he resumed work. At this time the neurological examination was entirely normal; the blood pressure was 160/82; pulse, 84; and weight, 165 lbs. The patient had been taking phenobarbital, ½ grain, 4 times daily since carotid ligation was done on January 12, 1954.

3rd Admission. In January, 1957, he complained of "too frequent headaches" occurring almost daily associated with a "roaring sound" in both ears. These suboccipital headaches with pain extending into both shoulders continued through February. Despite the absence of nausea, vomiting or signs of meningeal involvement it was felt advisable to repeat cerebral arteriography to determine whether there was an increase in the size of the right carotid aneurysm with leakage or whether an aneurysm had developed elsewhere. He returned to the Graduate Hospital on March 2, 1957. Studies at this time revealed normal neurological examination; normal laboratory findings; absence of carotid pulsation on the right; an apical systolic murmur with radiation to the cardiac base and left axilla; the blood pressure was 160/100, pulse 80, and respiratory rate 22.

On March 4, 1957, a left cerebral arteriography showed an aneurysm arising from the medial aspect of the carotid siphon, and a projection arising from the anterior cerebral artery representing an additional aneurysmal site (Fig. 3). The previous arteriogram of the left side had been normal. In view of the fact that the right common and internal carotid arteries were ligated and the multiple aneurysms affecting the internal carotid and anterior cerebral arteries were in the dominant hemisphere there was no choice but to pursue a course of conservative treatment. This consisted of bed rest and analgesics for headache. Hypotensive medication was not given. He became symptom-free and left the hospi-

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Cerebral Aneurysms with Abdominal Aortic Aneurysm

Fig. 1. Arteriogram (January 8, 1954), showing the large aneurysm of the terminal portion of the right internal carotid artery, right lateral view.

Fig. 2. Arteriogram (January 11, 1954), left carotid injection, showing normal vascular pattern, left lateral view.

Fig. 3. Arteriogram (March 4, 1957), showing aneurysms of the left internal carotid and anterior cerebral arteries, left lateral view.
tal on March 6. Acetylsalicylic acid 5 grains, 4 times daily was prescribed in the event of headache and the phenobarbital was continued as an anticonvulsant.

Once again he returned to work and was relatively free of headache until May 14, 1957, when he fell and fractured his left wrist. Immediately following the injury he vomited and lost consciousness for a short but undetermined period of time. He was admitted to a local hospital where he recovered consciousness and then complained of severe headache. Upon his return home 3 days later he developed profound lethargy which continued for several hours.

4th Admission. He was taken to the Graduate Hospital on May 21, where he was readily aroused and remained conscious. There had been and were no convulsions or tremors, nor were there any motor or sensory deficits. Repeated laboratory studies yielded normal values and the cerebrospinal fluid was under normal pressure, clear and colorless and the cytologic and chemical studies were normal. On May 25, ptosis of the left upper eye lid, dysarthria and mild expressive aphasia appeared. Headache was minimal. The objective phenomena subsided by May 28, and he was discharged on June 1, 1957. He improved rapidly thereafter and was counseled not to return to work. The patient and his wife moved to Florida in September, 1957.

5th Admission. He continued to be active and upon request came north for complete study on July 24, 1959. For several months prior to this he had noticed a pulsating mass in the midabdominal area which had gradually increased in size. Detailed physical and neurological examination plus radiographic study of the chest disclosed the following positive findings: pulmonary emphysema; grade 3 to 4 late systolic murmur maximal at the apex and transmitted to the left axilla; a large fusiform, pulsatile, expansile mass, extending from 4 cm. above to 6 cm. below the umbilicus just to the left of the midline, which yielded, on auscultation, a loud bruit synchronous with the cardiac impulse; blood pressure was 162/80; pulse, 80; respiration, 22; weight, 164 lbs. The pulse in the peripheral vessels was full and equal on the two sides.

The diagnosis of aneurysm of the abdominal aorta was entertained and the patient was referred to Dr. Brooke Roberts, of the Hospital of the University of Pennsylvania, for surgery. The patient was admitted to that hospital on September 1, 1959, and after thorough preoperative study it was considered safe to proceed with a laparotomy despite the presence of multiple cerebral aneurysms and a ligated right internal carotid artery.

Operation. On September 3, 1959, excision of an abdominal aortic aneurysm with insertion of a knitted Teflon bifurcation graft and an appendectomy were performed. The aneurysm was fusiform and extended from below the renal arteries to and including the proximal portion of both common iliac arteries. On the 1st postoperative day there was evidence of sharp abdominal bleeding necessitating reexploration and control of several leaks from the Teflon graft. Hemostasis was effected and a total of 8500 cc. of blood was given during the 2 operative procedures. From the 3rd to 9th postoperative day the patient was disoriented and hallucinated but this gradually subsided and he was discharged from hospital on September 23, 1959. The pathologist’s report was as follows: “The gross specimen consists of 3 large pieces of aorta and 4 smaller fragments. The largest piece is the terminal portion of the aorta as it bifurcates. This segment is 7.5 cm. long and is dilated to approximately 7 cm. There is an oval portion of aorta approximately 8 cm. in diameter and a 2 cm. long portion. The wall of the aorta is thin and there are atheromatous plaques on all surfaces. Microscopic examination: The sections show a thickened arterial wall with many areas of cholesterol deposition. In some areas bone formation is seen. There is organized thrombus present in the vessel. Small areas of inflammatory infiltration are also seen in the specimen. Diagnosis: atherosclerotic aneurysm of abdominal aorta.”

The patient remained free of symptoms other than occasional headache until June 24, 1960, when he returned because of a large abdominal incisional hernia. This was successfully repaired by Dr. Brooke Roberts on November 16, 1960. He has been examined at about trimonthly intervals since the last operation and has led a life somewhat more than moderately active, despite episodic periods of respiratory distress incident to the pulmonary emphysema. During the year prior to the present writing he has been free of headache and has had no neurological complaints or abnormalities.

Comment

Ulrich and Sugar7 reported a series of familial cerebral aneurysms among which was a patient with 3 intracranial cerebral aneurysms and a 4th extracranial aneurysm of the left internal carotid artery at the level of the angle of the mandible. Cerebral aneurysms may occur together with congenital abnormalities such as coarctation of the aorta and polycystic kidneys.8 A case of coarctation of the abdominal aorta with death from rupture of an aneurysm of the left anterior cerebral artery in a 77-year-old man was reported by Kaufman and Markham.9 Single or multiple cerebral aneurysms may be present concurrently with intracranial neoplasms. Love4 reported 2 cases, one of a sphenoid ridge meningioma, subtotally removed at operation, which surrounded an aneurysm and subsequent angiography revealed 3 aneurysms of the right carotid siphon successfully treated by ligation of the right common carotid artery; the other was a chromophobe adenoma of the pituitary associated with an intracranial aneurysm of the right internal carotid artery, the latter being treated by means of ligation of the right common carotid artery because the base of the aneurysm was too broad for clipping. Brihaye and Barredo1 have reported the presence of colloid cyst with multiple cerebral aneurysms in the same patient.

The most recent tabulation of recorded cases of multiple intracranial aneurysms is that of Mckissock et al.10 In this tabulation there is a marked disparity between the incidence of multiple cerebral aneurysms proven by necropsy (21–25 per cent), and the incidence of those disclosed by angiography alone (5–17 per cent). The authors attribute this to the higher natural mortality in patients with multiple lesions and the failure of
angiographic diagnosis. In the present case report neither of these factors is responsible for the absence of aneurysmal involvement on the left side in the angiogram of January 11, 1954. Therefore, the question regarding the origin of the aneurysms of the left internal carotid and anterior cerebral arteries in the case reported here arises. These were not present in the original normal-patterned angiograms of January 11, 1954, and if they were congenital berry aneurysms they would probably have been visualized at that time. In view of the later development of the left-sided cerebral aneurysms and the presence of atheromatous plaques throughout the specimen of removed abdominal aorta, it may be conjectured that they are atherosclerotic in type.

The patient in the case presented here was aware of the presence of a unusual mass in the abdomen and fortunately was examined before the abdominal aortic aneurysm ruptured. From the cases reported in the medical literature it is remarkable how few patients are aware of the existence of aneurysms of their peripheral vessels or the abdominal aorta. Gryska et al.,2 in a review of their experience with excision and graft replacement in 150 ruptured and unruptured aneurysms of the abdominal aorta, reported a 60 per cent mortality rate with resection after rupture as contrasted with 6 per cent when elective resection was done prior to rupture. It is not surprising that they conclude, "the time of choice for treating aortic aneurysms is before rupture."

Summary
We have presented a case of multiple bilateral cerebral aneurysms, treated by surgical and non-operative conservative methods, coincident with an abdominal aortic aneurysm successfully treated surgically.

It seems evident, from a review of the voluminous literature of intracranial aneurysm and the facts recorded in this report, that the desirable approach to the treatment of any individual case of intracranial aneurysm, single or multiple, is an eclectic one guided by the special problems to be solved.

An abdominal aneurysm can and should be treated definitively by elective surgery even in an individual harboring multiple cerebral aneurysms.

References