SUCCESSFUL SURGICAL TREATMENT OF AN INTRACRANIAL MYCOTIC ANEURYSM COMPLICATED BY A SUBDURAL HEMATOMA

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Although mycotic aneurysms are always listed among the varieties of intracranial aneurysms when a differential diagnosis is being attempted, actually their incidence is quite small. Leaking aneurysms that are the source of subdural hematomas are likewise rare, so that the combination of a mycotic aneurysm producing a subdural hematoma is decidedly uncommon.

The patient in the present case entered the hospital with a tentative diagnosis of a subarachnoid hemorrhage. It was only with the passage of time that the actual state of affairs disclosed itself.

CASE REPORT

M.B., a white female aged 23 years, was admitted to the Robert Packer Hospital on Jan. 21, 1956 because of the sudden onset of a severe, excruciating headache. She had been followed in the rheumatic heart clinic for a number of years, but had been considered asymptomatic. There had been no chills or fever in the recent past. On the day of admission there suddenly developed, without apparent cause, a very severe headache of the vertex and suboccipital region which had persisted unabated. Shortly thereafter, she began to vomit. When seen by her family physician, ptosis of the left upper eyelid had appeared.

When admitted into the hospital, the patient was lethargic and complained bitterly of the headache. A harsh systolic murmur was heard in the mitral area of the heart. The neck was decidedly stiff. Speech was thick and aphasic. An almost complete left-sided 3rd nerve palsy was evident. A mild right hemiparesis was present, and bilateral extensor toe responses were noted.

The obvious diagnosis seemed to be a subarachnoid hemorrhage, secondary to an aneurysm in the circle of Willis. A lumbar puncture was done immediately. The pressure was 290 mm. of H2O. To the chagrin of the admitting physician, the fluid was crystal-clear and contained 23 mg. per cent of protein. Despite this peculiar finding, she was treated as though she had intracranial bleeding, and was kept at strict rest in bed.

During the next 2 days, the intensity of the headaches subsided. It was noted that she was running an irregular fever with temperature spikes up to 101.4° F. Count of red blood cells was 3,700,000, hemoglobin was 12.3 gm., and count of white blood cells was 8,750. Because of the fever and the known rheumatic heart disease, a blood culture was secured. The next day, the media contained a growth of Streptococcus pyogenes.

On Jan. 25, 1956, bilateral carotid arteriography was done. Again to our surprise, no aneurysms were found on the circle of Willis, but an aneurysm far out on the left angular artery was demonstrated (Fig. 1). Rest in bed was continued and the hemiparesis disappeared within a few days. The 3rd nerve palsy began to clear and visual fields remained full. On Feb. 7, 1956, it was noted that the patient had a left facial weakness of the central type, a left hemiparesis and a left-sided Babinski’s response. For the first time, bilateral papilledema was noted.

Ventriculography was done on Feb. 9, 1956; this revealed a large mass in the left parietal region. Craniotomy done the same day disclosed a massive subdural hematoma covering about one-half of the left cerebral hemisphere. As this was removed, the aneurysm previously demonstrated came into view and was found to be actively leaking. This was completely excised.

Recovery was uneventful and the ligation of the angular artery at this point did not produce any recognizable neurologic deficits. The bacterial endocarditis was treated with penicil-
lin, 600,000 units 3 times a day. Her temperature remained normal and the blood culture became sterile. During her convalescence, infection developed in a tooth, which required extraction. Culture from the abscessed tooth disclosed a *Streptococcus mitis*, a different organism from that responsible for the endocarditis.

The patient has remained well to date, a period of 3 years, with no evidence of recurrence of the endocarditis, nor any further episodes of intracranial bleeding.

**DISCUSSION**

The actual number of patients who have had intracranial mycotic aneurysms, and on whom operations have been performed, are few. Dandy, in his book on aneurysms, mentioned 6 patients, only 1 of whom came to operation. All of them succumbed to an intracranial hemorrhage. He stated that the middle cerebral system of vessels appears to be the site of predilection, citing 5 instances of involvement. His sixth patient had an aneurysm in the posterior cerebral artery. It was pointed out that the patients were all young, in their teens or twenties, and that they were known to suffer from bacterial endocarditis. Pathologic studies disclosed a polymorphonuclear-cell infiltration of the walls of the aneurysm, and in one there was a frank exudate of pus. Dandy's series comprised 108 patients in whom 133 aneurysms were demonstrated (15 per cent multiple). In none of the patients could multiple mycotic aneurysms be found.

The experience of Ray and Wahal was somewhat different from Dandy's. They studied 4 instances of subarachnoid hemorrhages in patients with subacute bacterial endocarditis. They concluded that only 2 of their patients had mycotic aneurysms while 2 had an infection superimposed upon a congenital aneurysm. Also, 2 of the patients were in the 5th and 6th decades of life. All died as a result of hemorrhages from the aneurysms. The middle cerebral vessels were implicated in 3 instances and
the posterior cerebral artery in 1. The rarity of mycotic aneurysms was again stressed since they indicated that of 175 subarachnoid hemorrhages, in only 2 instances was a mycotic aneurysm responsible, and in 2 other instances, a secondary infection of a congenital aneurysm.

Reports of the surgical evacuation of subdural hematomas secondary to the rupture of mycotic aneurysms have not been easy to locate. No definitely demonstrated case was found in the medical literature although it is admitted that the search was not exhaustive. In their discussion of subdural hematomas, Clark and Walton reported an instance of a patient (Case 7) succumbing to an intracranial hemorrhage arising from an aneurysm of the left middle cerebral artery. A sizable subdural hematoma was found in association with an intracerebral clot. The patient was known to have subacute bacterial endocarditis. Postmortem study by the authors disclosed it was "an aneurysm of mycotic origin." No detailed pathologic description is given, nor are illustrations provided, so that it is impossible to know how the aneurysm fits the criteria of Ray and Wahal.

The symptoms caused by an intracranial hematoma are often difficult to differentiate from those of subarachnoid bleeding. Later, the subdural hematoma may become the critical portion of the illness and require immediate treatment. This was true in our case. Bassett and Lemmen indicated that the subdural hematoma formed because of the close approximation of the aneurysm to the arachnoid, possibly being adherent to it, and through a tear in the arachnoid allowed the blood to get into the subdural space. This situation appeared to be present in our patient since the arachnoid was attached firmly about the aneurysm.

In an earlier paper, Vance related his experiences as a medical examiner, with ruptures of surface vessels of the cerebral hemisphere as a cause of subdural hematomas. Trauma and alcohol were significant factors. He did not mention aneurysms, either of the congenital or bacterial varieties, as being a source of bleeding, despite the large size of his series.

There has been a great disparity in the incidence of mycotic aneurysms as reported in various series. Because of poor definitions of what constitutes a mycotic aneurysm, together with absent or inadequate pathologic study of the aneurysm itself, many of the series reported in the past are probably highly inaccurate as to the proper incidence of mycotic aneurysms. Confusing the situation even further, Ray and Wahal pointed out that it is quite possible for a pre-existing congenital aneurysm to become infected, especially in patients with subacute bacterial endocarditis. The criteria used by Ray and Wahal to distinguish "true" mycotic aneurysm from congenital aneurysm does not seem to this author to be entirely satisfactory, so that the exact number of aneurysms arising from infections in arterial walls is still somewhat obscure. Suffice it to say that all reports indicate they are rare.

In the case under discussion, I consider the aneurysm a "true" mycotic one for several reasons. First, its position is most unusual for the congenital type; second, the arachnoid was quite adherent to the aneurysm, suggesting an inflammatory response; third, the walls of the aneurysm contained many areas of polymorphonuclear leukocytes and granulation tissue; and fourth, there was no neck to the aneurysm, it being a bulbous mass in continuity with the artery. Microscopically, the walls show disjointed areas of muscle, and fibrous and granulation tissue. However, from the size of the aneurysm, it must have been some time in forming and it was certainly not an acute necrosis of the wall of the vessel.
MYCOTIC ANEURYSM WITH SUBDURAL HEMATOMA

It is surprising that in the majority of cases in which "mycotic" aneurysms are described, they are single. If they are only infected congenital aneurysms, then it is more understandable since multiple congenital aneurysms appear in only about 15 per cent of patients affected with this disorder.

While logically it might be expected that the showers of bacteria and tiny infected emboli could lead to many focal areas of destruction, especially in walls of arteries, this seems to occur with extreme rarity.

Direct surgical attack on aneurysms complicated by subdural hematomas has been reported infrequently. A recent survey by Bornstein and Bender\(^6\) indicates that the diagnosis is rarely considered, and apparently more rarely acted upon. In reports of successful cases in which both the aneurysm and the subdural hematoma were treated, the aneurysms, to my knowledge, have been only of the congenital variety.

In the present case, the mycotic aneurysm occupied a most favorable position, being on the surface, in a readily accessible vessel. The treatment of the chronic subdural hematoma was accomplished with ease. When subdural hematomas are diagnosed before the brain has been irreparably damaged, the recovery is generally excellent. With the present facilities for treating subacute bacterial endocarditis, which make the prognosis for longevity so much better than it has been in the past, the successful ligation or excision of a mycotic aneurysm should yield a gratifying result. This has been borne out in the present instance.

**SUMMARY**

A patient with subacute bacterial endocarditis had a mycotic aneurysm, located in the distal portion of the angular artery. When the aneurysm leaked, it produced a subdural hematoma instead of the usual subarachnoid hemorrhage. At first the symptoms suggested a subarachnoid hemorrhage but later they were those of an intracranial mass. Removal of the hematoma and excision of the aneurysm resulted in the complete relief of symptoms and without recognizable neurologic deficit. With the control of the endocarditis, the patient has been well for 3 years.

**REFERENCES**