Aneurysms of the Vertebrobasilar System*

Surgical Intervention in 19 Cases

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Aneurysms of the vertebral, basilar, cerebellar, and posterior cerebral arteries have received scant attention in neurosurgical writing. They are usually dismissed as “aneurysms in other sites” in published reviews and in reports of large series of intracranial aneurysms.3-6,9 Yet some of these papers 4,6,9 indicated the considerable case with which examples of fatal aneurysms of the vertebrobasilar system, managed conservatively or surgically, can be accumulated.

Recently, an increasing literature, consisting chiefly of sporadic reports of successful surgical treatment, draws attention to the importance of these aneurysms. Of particular interest is the clinical and surgical assessment of the problem by Dimsdale and Logue.1 Drake1 collected the literature on the subject to 1960. Since that time other writers7-8,10 have reported successful surgery and have advocated more frequent use of vertebral angiography in the investigation of subarachnoid haemorrhage as a result of their optimism regarding the possibility of surgical attack upon aneurysms on these vessels.

It may be suspected, however, that the present literature is considerably biased because successful operations tend to be reported, and unsuccessful ones do not. Thus it is questionable whether such figures as those produced by Drake,2 obtained by summation of published cases, present a valid picture of the mortality and morbidity which may attend surgical endeavour in this field.

The present paper reports a series of 19 patients with aneurysms of the vertebrobasilar system treated by operation over the past 6 years. The series includes all examples of aneurysm in these sites from a personal experience with over 250 craniotomies for aneurysm in the same period.

Basis of Diagnosis

In 18 of the 19 cases in this series, the aneurysm was the cause of the patient’s illness. In 16 cases subarachnoid haemorrhage from the aneurysm in question was the presenting factor. In 2 others (Cases 1 and 13), the patient was seen because of pressure of the aneurysm on surrounding structures, although in Case 13 earlier haemorrhage from the aneurysm may have occurred. The patient (Case 14) in whom the aneurysm was not the cause of illness suffered a spontaneous intracerebral haemorrhage wrongly believed to have been caused by a fusiform aneurysm of the basilar artery, which was explored and found not to have bled.

Three patients (Cases 4, 12 and 13) were operated upon without prior angiographic demonstration of the lesion. In all other cases the aneurysm was demonstrated by deliberate vertebral angiography, although in Case 1 partial filling of a posterior cerebral aneurysm in a carotid angiogram indicated the desirability of this procedure.

Selection for Surgery

One difficulty in the assessment of the results in any reported series of aneurysms, and of the policy upon which such results are based, is appreciation of factors influencing selection of patients in any particular surgical unit.

In the Brisbane Hospital policy in the management of intracranial aneurysms has

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been directed to early attack on all aneurysms which angiography shows to be accessible surgically and operable technically.

In lucid patients without major neurological deficit, the 5th day after haemorrhage is chosen as the day for operation, although limited flexibility is allowed when this particular day is inconvenient. In more seriously ill patients, operation may be delayed longer if the patient's condition is stable and expected to improve. Such improvement is interpreted as a sign of relaxation of vascular spasm, and thus of danger of renewed haemorrhage, and operation follows as soon as possible. The date of operation may be advanced, sometimes to the category of "immediate surgery", when progressive deterioration indicates impending disaster from a space-occupying haematoma, or repeated and frequent haemorrhages appear to demand early intervention for their arrest.

The operation preferred is definitive clipping or ligation of the neck of the aneurysm whenever possible, with trapping of an aneurysm on an expendable (or relatively expendable) vessel, or occlusion of both aneurysm and vessel, as a second choice.

The Department of Neurology and Neurosurgery from which this series is reported is part of a major general public hospital receiving acute and unselected admissions in a capital city. Special admission to a specialist department is not a necessary prelude to neurosurgical consultation or investigation. However, some patients from smaller outlying communities in the State of Queensland must be flown 1,000 miles or more to neurosurgical aid. Thus some selection, geographically determined, of relatively fit patients occurs, while time taken in communication and transport may delay operation beyond the day selected according to the policy stated above.

Most of the patients diagnosed as suffering from subarachoid haemorrhage are referred for neurosurgical opinion. All of these patients are submitted to early angiography except those aged over a flexible chronological limit of 60 years, those in whom associated disease or disability outweighs aneurysm as a threat to longevity, and those who are moribund without suggestion of a space-occupying haematoma.

All but 2 of the aneurysms of the vertebro-basilar system demonstrated radiologically have been attacked surgically. The exceptions were an aneurysm of the posterior cerebral artery discovered as an incidental finding during angiography in a patient with early dementia, and an aneurysm of the basilar bifurcation which bled again, fatally, too soon after angiography for surgery to be possible.

Thus both the policy and the practice followed in this series are at least as radical as any advocated by the protagonists of more active surgical attack upon vertebrobasilar aneurysms.

**Case Reports**

Since so many of these patients exhibited features of particular interest, all cases are reported. For convenience, the aneurysms have been divided into 4 groups according to site, chronological order being observed in each group.

A summary of the clinical features is given in Table 1.

Group A. Aneurysms of the Posterior Cerebral Artery—4 Cases.

**Case 1. P.H.,** a 21-year-old fitter and turner, suffered a minor head injury on Dec. 13, 1957 without loss of consciousness. Four days later profound paralysis of his left limbs developed suddenly, and his right upper eyelid drooped. The cerebrospinal fluid was normal. A right parietal burr hole, made on suspicion of complication of the head injury, disclosed no abnormality. On Jan. 13, 1958, he was transferred 700 miles to our care.

**Examination.** The patient was alert and normotensive. The only neurological abnormality was severe left hemiplegia, maximal in the arm. Function of the 3rd nerve was normal.

Right carotid angiography showed a large fusiform aneurysm on the right posterior cerebral artery which filled poorly. Vertebral angiography confirmed this finding (Fig. 1a).

**Operation** was performed, under induced hypothermia, by a posterior subtemporal approach. The tentorium was divided to improve access. The aneurysm was fusiform, and embedded firmly for more than half its circumference in the lateral aspect of the cerebral peduncle. Excision of the aneurysm was decided upon and a clip