BLEEDING ANEURYSMS OF THE BASILAR ARTERY
DIRECT SURGICAL MANAGEMENT IN FOUR CASES*

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A few instances of direct or indirect surgical management of aneurysms on the vertebral-basilar system have been reported (Fig. 1). Interesting is the fact that among 30 patients treated by direct methods there were only 4 deaths (including personal cases). Of the 8 patients treated indirectly by ligation of the vertebral artery, 1 died. Only 2 patients have been reported as disabled. Our interest in aneurysms on this circulation has increased with the reports of successful cases, and the knowledge that vertebral angiography will demonstrate a considerable proportion of the lesions responsible for spontaneous intracranial bleeding when bilateral carotid angiography is negative. Walton, following an extensive review of the literature, felt that 15 per cent of aneurysms were on the vertebral-basilar system. Bullo reported that in 16 of 60 cases in which carotid angiography was negative, a vertebral angiogram demonstrated the lesion deemed to be responsible for the hemorrhage. Eight of these lesions were aneurysms, and 8 were angiomas. Two of the angiomas and 1 vertebral aneurysm were successfully excised. In London, Ontario, 30 vertebral angiograms have been done in the face of negative carotid angiography and lesions were found in 7 cases—5 aneurysms and 2 angiomas. Thus it would appear that the site of bleeding will be discovered in 1 out of every 4 cases. In the event that the vertebral angiogram is normal, the patient and the family can be informed of the greatly lessened risk of recurrent bleeding.

In view of the limited surgical experience with these lesions, it seemed proper to present and discuss 4 cases in which a basilar aneurysm was attacked directly in urgent fashion because of repeated bleeding. Three patients were operated upon within 24 hours of the last hemorrhage, and the other 36 hours after.

The surgical method was similar in each case. Through dissection of a cadaver, it was seen that the upper one-third of the basilar artery and its bifurcation are exposed simply by an anterior subtemporal approach, through the tentorial opening into the interpeduncular cistern. During induction of artificial hypothermia, a preliminary dissection of the neck was done in which both common carotid arteries were isolated under tapes and both vertebral arteries were exposed for three-quarters of an inch just below the carotid tubercle in the vertebral triangle. Subsequently, to facilitate final exposure of the aneurysm, bulldog clamps were placed on the carotid arteries and the vertebral arteries were occluded by the fingers of an assistant assigned for this purpose. This permitted total interruption of the cerebral circulation for brief periods. These usually were planned for 5 minutes at body temperatures between 26.0°C. and 28.0°C. and at least 5 minutes were allowed between interruptions.

With the patient in a semisupine position, a small temporal bone flap was turned down. The brain was made slack by intravenous 30 per cent urea and lumbar drainage of the cerebrospinal fluid. By retraction of the temporal lobe, the arachnoid was divided along the edge of the tentorium, exposing the entrance to the interpeduncular region be-
between the carotid artery in front and the cerebral peduncle behind with the 3rd nerve angling across inferiorly. The anterior choroidal artery was held up gently by the tip of the retractor. The 4th nerve was tucked down below the tentorial edge. It was not necessary to divide the tentorial edge except in Case 4 where the bifurcation of the basilar artery seemed to be quite low. Brief periods of complete arrest of the cerebral circulation now were used to complete the dissection of the neck and adjacent fundus of the aneurysm, for the clot in the interpeduncular cistern has proved to be tough and stringy in each case. With a slack aneurysmal sac there is not the same danger of rupture and the surgeon can be more bold and swift with the exposure of the sac and placement of a clip. The neck of the aneurysms of the bifurcation was found by following the posterior cerebral artery medially and inferiorly as it curved around the peduncle. Only in Case 4 was it necessary to divide the posterior communicating artery. In Case 1, the artery was held up by the tip of the retractor and in Cases 2 and 3, the artery was adherent to the fundus of the aneurysm and was occluded by the clip placed on the aneurysmal neck. The bone flaps were replaced in each case.

Case 1. A.N., a 50-year-old farmer, was well until Dec. 21, 1958, when he spoke incoherently to his sister on the telephone. He was admitted to his local hospital complaining of headache, diplopia and fatigue. During the following week he improved on rest in bed and sedation although the diplopia persisted intermittently. On December 29, he suddenly collapsed and was unconscious for 10 minutes. After transfer to the Neurosurgical Service he complained of severe frontal headache, diplopia and a desire to sleep and was amnesic for the week's events.

Examination. He was clammy, had a stiff neck, but there were no other abnormal neurological findings. The bloody spinal fluid was under a pressure of 580.

Bilateral carotid angiography did not disclose the source of the haemorrhage. On January 3, a right submastoid vertebral angiogram demonstrated the presence of a bilocular saccular aneurysm arising from the basilar artery at the level of origin of the superior cerebellar arteries (Fig. 2a). The separation of the artery from the clivus suggested the presence of local subdural clot.

Course. Meanwhile he had improved but on the morning of January 7 he complained to the nurse of pain beginning in his feet and spreading to his