CASE REPORTS AND TECHNICAL NOTE

LIGATION OF BASILAR ARTERY IN TREATMENT OF AN ANEURYSM AT THE BASILAR-ARTERY BIFURCATION*

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For several years the authors have been studying the collateral circulation of the brain as demonstrated arteriographically and have attempted to correlate these findings with the clinical picture.1-5 It was observed that when both posterior cerebral arteries were shown well by bilateral carotid arteriography, there was insufficient collateral circulation for sudden ligation of the internal carotid artery. The same was true when both posterior cerebral arteries were demonstrated if one carotid was injected and the other was compressed. It was concluded that in such cases the posterior cerebral arteries were dependent largely upon the carotid circulation for a considerable portion of their blood supply. Poor demonstration of the posterior cerebral arteries by vertebral arteriography is further affirmation of this. It was predicted that in such cases, there would be sufficient collateral circulation to ligate the basilar artery between the posterior cerebral and the superior cerebellar arteries.

This was done successfully in the following patient who had had four subarachnoid hemorrhages from the rupture of an aneurysm at the basilar-artery bifurcation. The postoperative arteriogram showed that the basilar artery was ligated completely and that the aneurysm was no longer demonstrable although the site from which it arose was well shown.

CASE REPORT

The patient was a 25-year-old male who had had a subarachnoid hemorrhage the day before admission. There were no focal neurological signs on examination, and the blood pressure was not elevated. The cere-

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Fig. 1. (a) Lateral view of original angiogram showing aneurysm at bifurcation of basilar artery. (b) Anteroposterior view of original angiogram demonstrating aneurysm arising at bifurcation of basilar artery. Note narrow space between origin of posterior cerebral and superior cerebellar arteries.
before readmission, there was sudden development of severe throbbing occipital headache. There were no abnormal neurological signs. Cerebrospinal fluid contained 380,000 red blood cells. Four days after admission, a vertebral arteriogram was performed. This showed the aneurysm to be more than twice its previous size (Fig. 2). The situation obviously was desperate. It was recalled that each of the posterior cerebral arteries was well demonstrated in the carotid arteriogram on each respective side (Fig. 3). Hence, there would be a good supply of blood to the posterior cerebral arteries if the basilar artery were ligated.

**Operation.** It was decided to ligate the basilar artery between the posterior cerebral arteries and the superior cerebellar arteries. This was done with the patient in the lateral position under hypothermia and with the use of urea. The approach was made underneath the right temporal lobe. A portion of the inferior temporal gyrus was removed to afford better exposure. The basilar artery below the superior cerebellar arteries was occluded temporarily using a Mayfield clip. Then the basilar artery was ligated with an Olivecrona clip placed between the superior cerebellar and the posterior cerebral arteries, and the temporary clip was removed.

**Postoperatively,** the patient had slight ptosis and slight paresis of superior gaze on the right. These cleared progressively. Two weeks after operation, roentgenograms of the skull disclosed that the Olivecrona clip had come off the basilar artery either because of the fact that it was not applied sufficiently tightly or that it was a defective clip. Reoperation was indicated.

As the patient was being prepared for operation, he had his fourth subarachnoid hemorrhage. Hypothermia was used, and the previous flap was re-opened. There was a clot in the subdural space under the temporal lobe, and the cerebrospinal fluid was draining from the temporal horn into this space. The cisterna pontis and interpeduncularis were filled with clot. The clots were removed, and a Mayfield clip was placed around the

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**Fig. 2.** Film made from vertebral angiogram 3 months later showing marked increase in size of aneurysm in the interim.

Cerebrospinal fluid contained 680,000 red blood cells. Bilateral carotid arteriography revealed no abnormalities, but both posterior cerebral arteries were well demonstrated. Vertebral arteriography demonstrated an aneurysm, 1 cm. in diameter, arising from the apex of the basilar artery at its bifurcation into the posterior cerebral arteries (Fig. 1).

He was kept in bed for 6 weeks and then mobilized, but his activities were restricted.

**Course.** Three months after the first hemorrhage, he had sudden onset of pain in the back of his head which disappeared within 24 hours. One week later, 3 hours

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**Fig. 3.** Lateral views of right and left carotid angiograms showing filling of posterior cerebral artery from each side.