Repair of an Aneurysm of the Basilar Artery by a Transclival Approach

Case Report

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Intracranial lesions ventral to the brain stem are difficult to treat and until recently have not been accessible to direct surgical intervention. Reports by Stevenson, et al., and Mullan, et al., indicate that the transclival approach is now being used with increasing frequency. The majority of the lesions treated have been neoplastic; only a few have been vascular. We are reporting the successful repair of an aneurysm located on the basilar artery just above its origin near the takeoff of the internal auditory artery. The procedure was done through a transcervical, transclival exposure.

Case Report

C. B., a 24-year-old Indian girl, was admitted to the University of Minnesota Hospital on January 4, 1966, with a diagnosis of aneurysm of the basilar artery. She had had three episodes of subarachnoid hemorrhage during the preceding year. The last hemorrhage on December 22, 1965, was associated with 15 minutes of complete blindness followed by unconsciousness. Bilateral carotid angiograms revealed no abnormality. A left vertebral angiogram demonstrated a saccular aneurysm arising at the origin of the basilar artery, near the takeoff of the internal auditory artery (Fig. 1).

Examination. Except for moderate nuchal rigidity, the general physical and neurologic examinations were normal. Because of the repeated episodes of hemorrhage, the last two occurring within a period of 3 weeks, it was believed that if the aneurysm were not obliterated there was little hope for her survival. For this reason, direct surgical intervention by the transclival approach was undertaken.

Operation. The operation was performed on January 12, 1966, under general anesthesia with endotracheal intubation and hypothermia. The patient was placed in a supine position with the head held in 3-point skeletal fixation. The neck was hyperextended and turned slightly to the left. A right-sided transverse cervical incision was made from the midline to the mastoid tip on a line approximately 4 cm beneath the mandible. Subplatysmal skin flaps were elevated, and the deep cervical fascia was incised parallel to the anterior border of the sternocleidomastoid muscle. The superior thyroid and lingual arteries and the twelfth cranial nerve were divided. The cervical fascia was incised, and the anterior aspect of the cervical spine palpated. A plane of dissection was then developed between the esophagus (and hypopharynx) and the anterior aspect of the vertebral bodies. Deep-bladed retractors were used to displace the esophagus and hypopharynx medially. Dissection was carried cephalad until the clivus could be palpated. The deep cervical muscles and the pharyngeal mucosa were reflected subperiosteally. The Hall surgitome was used to remove the anterior arch of the atlas, exposing the underlying odontoid process. About 1 cm of the top of the odontoid was resected using a surgitome and high-speed burrs.

A window measuring approximately 1 cm wide by 3 cm long was made in the clivus with the power drill. This gave what was considered adequate exposure of the dura overlying the ventral brain stem. On closer inspection, the dura appeared to be discolored a deep blue, suggesting underlying hemorrhage. A midline incision in the dura with lateral extension bilaterally was then made, and the dural flaps were retracted laterally. The aneurysm lay in the middle of the operative field. The distal basilar artery could be seen coursing beneath the aneu-
The aneurysmal wall was extremely thin, and while it was being inspected, it became increasingly turgid, ballooned outward rapidly, and burst. Diffuse hemorrhage occurred, and two suction tips were used to remove the blood from the operative field. We were about to place a large clip over the bleeding area when the suction apparatus failed. Considerable blood was lost before suction could be re-established. Understandably, the patient at this point had a cardiac arrest, in part due to blood loss while hypothermic, and in part due to brain stem manipulation. Closed-chest massage and external defibrillation were instituted. Meanwhile we proceeded to obliterate the aneurysmal sac with three Olivecrona clips. During the period of total circulatory arrest, we could clearly see that the aneurysm had been adequately clipped and that the continuity of the lumen of the basilar artery was intact. It is conceivable that the ultimate excellent rev visualization of the aneurysm was related to the fact that there was, by then, little or no blood coming from the basilar artery. The efforts at resuscitation were successful and the remainder of the operative procedure was uneventful. Prior to closure, the previously-sectioned twelfth nerve was sutured.

Postoperative Course. The patient awakened immediately from anesthesia, and the only neurological defect that could be detected was a right hypoglossal nerve palsy and a left abducens nerve palsy. For several days postoperatively, small amounts of cerebrospinal fluid drained from the right nostril and it was thought initially that the sphenoid sinus had been entered during the exposure of the clivus. However, repeated x-ray views of the sinuses failed to demonstrate an air-

![Fig. 1. Preoperative angiogram showing the vertebral basilar arterial system with the aneurysm evident on the basilar artery (arrow).](image1)

![Fig. 2. Postoperative angiogram 10 days after surgery showing the vertebral basilar system. The circulation in the basilar artery is intact. The silver clips are at the site of the occluded aneurysm.](image2)