The Surgical Treatment of Aneurysms of the Basilar Artery

CHARLES G. DRAKE, M.D.
Neurosurgical Unit, Victoria Hospital, and the University of Western Ontario, London, Canada

Aneurysms arising from any portion of the basilar artery may be exposed for surgical treatment by an approach through the middle fossa under the temporal lobe. From a surgical point of view, they should be divided into two groups: those arising from the bifurcation, and those along the trunk of the artery. The latter classically occur at the origin of the basilar, superior cerebellar, and anterior inferior cerebellar arteries. While basilar superior cerebellar aneurysms may be seen clearly in this manner, exposure of aneurysms along the trunk of the artery requires division of the tentorium; the length of the tentorial split is dictated by the position of the aneurysm behind the clivus.

Division of the tentorium far laterally allows direct access to aneurysms at the origin of the basilar artery, and even to those on the distal vertebral artery; the latter type is exposed by retracting the anterior cerebellum and angling down the posterior slope of the petrous bone to the prepontine space in front of the lower aspect of the clivus.

For aneurysms at the bifurcation, the exposure is continued across the tentorial edge into the interpeduncular cistern above and behind the dorsum sellae.

We have found that two surgical adjuncts, magnification of vision and profound hypotension under normothermia, are important for safe exposure and occlusion of any aneurysms. These surgical aids seem even more indispensable for basilar aneurysms since the confining nature of the exposure makes it imperative that the investments and connections of the aneurysm be seen clearly and the clip or ligature applied accurately with minimal risk of rupture. Rupture of a basilar aneurysm before completion of this dissection is calamitous, for hurried attempts to stem bleeding may result in injury to important structures and placement of the clip in such a way as to occlude more than the aneurysm.

Once the general location of the aneurysm has been reached, the use of 2½ power Loupes will magnify the region of the aneurysm with startling clarity. The tiny tissue planes show up so that sharp dissection may be used to free attachments to arachnoid, dura, or parent vessels.

Induction of deep hypotension at the same time to 40–50 mm Hg will allow the aneurysm to be approached boldly and facilitate removing clot and dividing arachnoid adhesions. The accurate definition of the base or even the whole aneurysm is simplified when its softness and pliancy allow indentation or displacement to uncover hidden aspects. We have used profound hypotension in 70 operations on various aneurysms; however, we only use it during the period necessary to complete the occlusion of the aneurysm. In straightforward cases, the pressure need only be lowered for a few minutes, but in complicated situations, mean arterial pressures at this level have been tolerated for over an hour without known residual effect, even in older patients.

The details of the surgical technique will be described under the following headings:

1. Craniotomy and initial subtemporal exposure
2. Aneurysms at the basilar bifurcation
3. Aneurysms on the upper basilar trunk at the origin of the superior cerebellar artery
4. Aneurysms on the lower basilar trunk, including those on the terminal vertebral artery.

Craniotomy and Initial Subtemporal Exposure

The patient is positioned lying on the left side for approach under the right temporal lobe (Fig. 1); an unusual location of the aneurysm or sure knowledge of right cerebral dominance may dictate otherwise. Either the radial or femoral artery is cannulated for accurate recording of mean arterial pressure. A