Posterior Circulation Aneurysms

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Since 1969, 218 aneurysms of the posterior circulation have been operated upon in our department. Of this group, 131 were saccular (size less than 15 mm), 47 were globular (15–25 mm), and 40 were giant aneurysms (greater than 25 mm). Aneurysms were seen at all the usual sites. Timing of operation was determined by the patient’s clinical condition and there was a trend toward operation after the 1st week following subarachnoid hemorrhage. All saccular and globular aneurysms were treated by direct clipping. Most of the giant aneurysms could be directly clipped, often only with the use of a “booster” clip. Those giant aneurysms which could not be directly clipped were treated by proximal ligation of the parent artery with or without bypass. The overall results show 165 of 218 patients (75.6%) having an excellent or good outcome; 20 patients (9.2%) had a poor outcome from their illness and/or treatment; 33 patients (15.2%) died. The results are discussed with respect to aneurysm location, aneurysm size, patient preoperative grade, and timing of surgery.

Successful operative treatment of aneurysms of the posterior circulation has evolved more slowly than that of aneurysms of the anterior circulation. Schwartz in 1948 was the first surgeon to obliterate successfully an aneurysmal sac embedded in the pons [4]. All case reports of such aneurysms prior to 1950 followed inadvertent encounters during an operation for a presumed tumor. Drake reported the first series in 1961 [1]. Reviewing the literature at the point, a total of only 47 cases had been reported and the results of operative treatment were discouraging. In 1965, Drake updated his own series to 14 patients and clarified the critical importance of the perforating vessels in the region of the basilar caput [2]. The advances in neuroradiology leading to successful imaging of both vertebral arteries and, finally, routine safe cerebral angiography via the transfemoral route in the early 1970s has allowed visualization of these lesions. But it was only with the application of the operating microscope to neurosurgery and the development of micro-instrumentation and progress in the engineering of clips that successful operative treatment became possible.

Subarachnoid hemorrhage (SAH) remains the most common indication for operation. The natural history of untreated but ruptured posterior circulation aneurysms is extremely poor: 60% of such patients die within 6 months and of these deaths, 60% are due to recurrent hemorrhage [6]. One year following recovery from the initial hemorrhage, the annual rebleed rate remains 2%–4%.

Globular (15–25 mm) and giant (>25 mm) aneurysms may produce local symptoms from mass effect or obstructive hydrocephalus. It is our belief that these unruptured but symptomatic lesions require operative treatment because the risk of subsequent rupture is quite high. Indeed, recent data suggest a worrisomely high rate of rupture for any aneurysm more than 10 mm in size [5].

Indications for operation for the smaller, unruptured saccular aneurysms are less clear and must be individualized. The decision will rest on an honest appraisal by the surgeon of the pathologic anatomy and the results of his own operating experience. Generally, we have not clipped such a small incidental aneurysm which was unruptured unless it could be safely exposed during the operation for a ruptured anterior circulation aneurysm. There is a worldwide trend toward early aneurysm surgery after SAH. In our department, the timing of operation is determined primarily by the condition of the patient and the location of the aneurysm. Consideration for early surgery is given to all patients who are grade I. If a patient has experienced only a “mild” bleed and shows little subarachnoid blood on CT scanning, then early operation is...

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undertaken. However, we feel that in many patients harboring aneurysms in the region of the basilar caput it is wise to delay operation until the effects of the acute hemorrhage subside. Elevation of the temporal lobe and satisfactory exposure of the vasculature in the region of the aneurysm seems more dangerous early after SAH. Our only indication for early operation in grade III or IV patients is a localized mass.

Operative management involves lumbar spinal drainage, 20%mannitol with or without furosemide if the temporal lobe is to be elevated, and intraoperative hypotension during the critical dissection of the aneurysm neck. Mean systemic arterial pressures in the range of 50–60 mmHg are maintained primarily by the volatile anesthetic (isoflurane), supplemented with nitroprusside. If temporary occlusion of a parent vessel is necessary, then the blood pressure is maintained in the patient’s normotensive range and the neural tissue rendered ischemic is protected by a preocclusion administration of barbiturate.

The surgical approaches have been adequately described elsewhere by many authors and will not be described here in detail. Aneurysms in the region of the basilar caput are approached either in the manner of Yaşargil et al. from the pterion [7] or in the manner of Drake beneath the temporal lobe [3]. The decision regarding approach is made based upon the relation of the aneurysmal neck to the dorsum sellae and the projection of the fundus. All other posterior circulation aneurysms occurring at or above the anterior inferior cerebellar arteries are approached in a subtemporal manner; those superior cerebellar basilar artery aneurysms projecting to the left are approached from the left whereas the others are approached from the right. The aneurysms occurring at the vertebral-basilar junction and along the intracranial vertebral artery are best approached through a retromastoid craniectomy with the patient in a modified park bench position. Distal posterior inferior cerebellar artery (PICA) aneurysms are approached by a midline suboccipital craniectomy with the patient either sitting or prone.

A total of 218 aneurysms of the posterior circulation have been treated in such fashion by our department since May 1969. Of the total group, 128 aneurysms were in the region of the basilar caput, 51 were PICA aneurysms arising either at the vertebral junction or more distal in the vessel’s course, and 39 occurred along the basilar trunk. Four categories were used for judging the results of surgery: (a) excellent, normal employment, with normal mentation and little or no neurological deficit; (b) good, neurological deficit but with normal mentation and employment; (c) poor, anything less than full activity; and (d) death. Any death within 6 months is reflected in the mortality figure. The overall results are given in Table 1: 130 with excellent outcome, 35 with good outcome, 20 with poor outcome, and 33 deaths. The site-specific result for the three categories of aneurysm is given in the same table.

When the results are correlated with size of aneurysm (Table 2), it is appreciated that many of the poorer results were in patients with larger aneurysms. Thus, there were 47 globular aneurysms (15–25 mm), among which there were eight poor results and six deaths for a combined major morbidity/mortality rate of 30%. Similarly, there were 40 giant aneurysms (>25 mm), among which there were six poor results and ten deaths for a combined major morbidity/mortality rate of 40%. These are to be compared with the smaller saccular aneurysm subgroup (<15 mm), in which the combined major morbidity/mortality rate was 15%.

Table 3 presents the outcome data with respect to preoperative grade of the patient by the Botterell classification. All grade 0 patients harbored globular or giant aneurysms which were symptomatic by virtue of mass effect. Table 3 confirms