TIMING AND TECHNIQUES IN THE INTRACRANIAL SURGERY OF RUPTURED ANEURYSMS OF THE ANTERIOR COMMUNICATING ARTERY*

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ANEURYSMS of the anterior communicating artery are notoriously difficult to treat either by conservative or surgical means.

Conservative therapy has led to a mortality ranging from 44.5 per cent (Logue) to 52 per cent (McKissock et al.) while Slosberg reported 33 per cent on using hypotensive therapy in addition to rest in bed. A recent long-term review by Ballantine however, shows that 14 of 18 patients not operated upon died of recurrent hemorrhage within 8 years of their first episode of bleeding although all were "at some stage of their hospitalization in a status which would permit surgery." This means a long-term mortality rate of over 70 per cent.

Patients of reasonably good risk treated properly by surgery, on the other hand, today appear to have a far better prognosis than that offered by conservative therapy, as indicated by data in the following survey. This is largely because appropriate surgical intervention usually prevents deaths from recurrent hemorrhage.

In the hope of gaining more information about factors that contribute to the success of surgery, such as the optimal timing and technique of operations, questionnaires were sent to over 20 neurosurgeons† asking for details of their experiences with this problem during the past 3 or 4 years. The data thus generously supplied for over 200 cases were tabulated. Questionnaires were not sent to certain neurosurgeons who had already published this type of data, while some who were invited to participate sent their regrets.

Every type of intracranial procedure listed was carried out by at least 4 and usually by 10 or more of the neurosurgeons participating in this survey.‡ A few apparent discrepancies in some of the tables are the result of insufficient details in some of the reports submitted. All data apply only to favorable-risk (alert) or reasonably favorable (lethargic) -risk but not comatose patients. Comatose patients are not considered in detail because all died except 2 who underwent operation to salvage them.

Ligation of the carotid artery in the neck also has not been considered because it was reported in only 3 cases. Although all 3

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† Comments and discussion concerning this survey reflect the views of the writer and are not necessarily shared by those who contributed.
patients have fared well thus far, as have Odom's\(^7\) 5 patients treated similarly, Shenkin\(^8\) has reported a mortality of close to 50 per cent following ligation of the carotid artery for the treatment of ruptured aneurysms of the anterior communicating artery. The use of deep hypothermia with circulatory arrest also has not been mentioned because this procedure had been used in so few cases at the time these questionnaires were mailed.

In the tables that follow the letter "E" stands for excellent as to postoperative result, "F" for fair (meaning a slight but not incapacitating neurological deficit that may or may not have existed prior to surgery), "P" means the poor or permanently incapacitated patients thus representing morbidity, while "D" indicates those who died. The mortality rate includes all patients who died from any cause clearly related to surgery within a year after operation.

**TIMING OF OPERATION**

Table 1 suggests that if early intracranial surgery is contemplated the ideal time after the last hemorrhage is from the 7th to the 9th day inclusive. This is in keeping with recent surveys by Mr. Murray Falconer and Mr. A. E. Richardson, both of London, England (personal communications).

The mortality rate is high for patients operated upon during day 1 through 6 after hemorrhage, but far better from days 7 to 9. The high mortality rate of 39 per cent from days 10 to 13 (Table 1) may reflect a tendency in some otherwise favorable cases for the delayed effects of cerebral vasospasm\(^8\) to affect adversely the outcome of surgery in this period. One patient listed in this group died of recurrent hemorrhage during the induction of anesthesia.

Five other patients of favorable risk, all under 50 years of age and alert, also died of recurrent hemorrhage although in the hospital awaiting planned surgery: 1 on the 7th, 3 during the 10- to 13-day period, and 1 on the 20th day after subarachnoid bleeding. Thus 6 (or 8 per cent of all comparable patients of good risk who were operated upon during these same periods) died without the possible benefits of surgery, because of delayed operative intervention (Table 1).

To summarize: delay of operation for more than 9 days may lead to unnecessary loss of life while too early surgical intervention, from days 1 to 6, carries a forbiddingly high mortality rate (except for young good-risk patients). Since the mortality is lower in the 7- to 9-day period than in the 1- to 6- or 10- to 13-day intervals, the ideal time for the surgery of these aneurysms of the anterior communicating artery, after presenting hemorrhage, would seem to be 7 to 9 days. Another reason for not delaying operation is indicated by Table 3 which shows a higher surgical mortality and a higher incidence of coma if recurrent hemorrhages have occurred.

Before discussing surgical techniques, let us first look at other factors that may influence the results of intracranial surgery.

**FACTORS RELATED TO INTRACRANIAL SURGERY**

Age. In all the operative cases of patients under 50 years of age the mortality was approximately 20 per cent and for just clipping the aneurysm approximately 17 per cent. For all patients over 50 the mortality was 24 per cent and for clipping the aneurysm 12 per cent (Table 2).

A further breakdown of cases in which the aneurysm was simply clipped is shown in Table 9. For alert patients under 50 years of age (A) the mortality ranged from 9 to 13

### Table 1: Timing of operation

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* One patient died during induction of anesthesia.