INTRACRANIAL ANEURYSMS
RESULTS OF SURGICAL TREATMENT

JAMES L. POPPEN, M.D., AND CHARLES A. FAGER, M.D.
Department of Neurosurgery, The Lahey Clinic, Boston, Massachusetts

(Received for publication October 28, 1958)

It has often been stated throughout the general literature on intracranial aneurysms and subarachnoid hemorrhage that no large series of cases of verified intracranial aneurysms treated by conservative measures has yet been compiled so that the results of this form of treatment could be evaluated in comparison with the surgical treatment of these lesions. Indeed, it is somewhat doubtful that a large number of patients with arteriographically demonstrated aneurysms will ever be observed so that their history can be studied and followed for a number of years. The reason for this, in our opinion, is that improvement in neurosurgical techniques and increasing experience in the surgical treatment of intracranial aneurysms have led to a gradual decrease in the surgical mortality rate and reduced the frequency of recurrent hemorrhage in surgically treated patients.

While it is true that the natural course of the symptomatic aneurysm has not been established with certainty, the literature abounds with overwhelming evidence to indicate that an untreated aneurysm is a potentially explosive lesion associated with a high mortality rate and probably accounting for about 80 per cent of the cases of spontaneous subarachnoid hemorrhage at all ages.

Walton, in his very detailed monograph on subarachnoid hemorrhage, has made the most thorough review of the literature to date, and has also presented a complete study of 312 patients admitted over a 10-year period to the Royal Victoria Infirmary at Newcastle. The presence of aneurysms was verified in 63 cases and assumed in the majority of those cases of hemorrhage in which the cause was unknown. In a total of 1480 cases collected from reported series, including the Newcastle group, the immediate mortality was approximately 45 per cent. Most of the deaths occurred during the initial hospital stay following subarachnoid hemorrhage. In Walton’s series (Table 1), 91 patients died during the first attack and 47 more died of recurrent bleeding within 8 weeks, a total of 138 deaths. It is generally known and agreed that most immediate deaths from subarachnoid hemorrhage caused by a ruptured aneurysm usually occur during the first 24 hours; bleeding is especially likely to recur during the second and third weeks after the initial hemorrhage, with gradually decreasing incidence of further bleeding following this.

A later mortality from recurrent hemorrhage has also been reported, and in Walton’s particular series, 20 per cent of the survivors (an additional 35
### TABLE 1

*Newcastle series (Walton)*

<table>
<thead>
<tr>
<th>Immediate deaths</th>
<th>Subsequent deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>91 first attack</td>
<td>35</td>
</tr>
<tr>
<td>47 recurrence in 8 weeks</td>
<td></td>
</tr>
<tr>
<td>138</td>
<td>20% of survivors (35 patients) died of recurrent hemorrhage, half of these within 6 months</td>
</tr>
</tbody>
</table>

patients) died of recurrent hemorrhage within 6 months of the original hemorrhage. After 6 months, this author concluded that the risk of fatal recurrent bleeding was only 11 per cent; but, in addition, the number of disabling neurological deficits was significant. Thus, of 120 survivors, he found that 39 patients had moderate or severe sequelae and 5 were completely disabled. Magee traced 66 survivors from a group of 150 patients and found that 21 (14 per cent) were disabled and were unable to carry on normal lives.

Mount compiled a series of 752 conservatively treated cases of subarachnoid hemorrhage from many sources, including 130 of his own. He found that the average mortality rate was around 48 per cent. This should be compared with a 14 per cent mortality in 469 surgically treated cases, including 9 (11.7 per cent) of 77 in his own group. Small et al. also have drawn a comparison between the results of conservative and surgical treatment. In their series of 100 consecutive cases, 43 deaths occurred during the initial period of hospitalization, and only one-third of these patients died during the first 24 hours. Of the 57 survivors, 8 died of recurrent hemorrhage and 7 were totally disabled. Neurosurgical treatment is aimed not so much at saving those patients who died within a few hours of an overwhelming intracranial hemorrhage as it is in preventing the disastrous recurrence of bleeding. At the present time such treatment could be applied and would certainly be indicated in those patients who survived the first 24 to 48 hours after the initial hemorrhage. In 50 subsequent consecutive patients treated surgically, 16 had an intracerebral hemorrhage; the immediate surgical mortality was considered to be 12 per cent. Although 52 per cent of the survivors had some neurological disability, only 12 per cent were totally disabled.

McKissock and Walsh, in their series of conservatively treated cases of verified aneurysm, found a similar mortality rate of about 50 per cent. They have likewise attempted to assess the results of surgical treatment for purposes of comparison, making a detailed classification of cases according to the severity of hemorrhage and the site of the intracranial aneurysm. They graded the aneurysms in much the same way as malignant lesions would be graded, thereby presenting the most critical comparison yet to appear. In their series of 108 medically treated patients, 57 died (53 per cent). Thirty-