SURGICAL TREATMENT OF ANEURYSMS OF THE ANTERIOR COMMUNICATING ARTERY

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A study of the literature shows that there has been increasing interest in the surgical treatment of intracranial aneurysms, largely because of the extremely poor ultimate prognosis of conservative management in cases of subarachnoid hemorrhage from this source. With accumulating experience, the surgical mortality is improving and more authors are coming to the opinion that surgical attack of one sort or another is the method of choice in the approach to this problem. Interest has therefore been aroused as to the types of procedure effective in these cases and the specific indications for each in an effort to combine maximum result with minimum of hazard.

Because of their unique location on the major anterior channel for collateral circulation in the circle of Willis, we feel that aneurysms of the anterior communicating artery represent a special problem in the surgical treatment of intracranial aneurysms. In spite of their infrequent separation as a distinct category in the literature, they are not properly comparable to other intracranial aneurysms either in assessment for surgery or in choice of surgical procedure to be employed.

The present material comprises 26 cases of aneurysms originating from

TABLE 1

24 surgically treated aneurysms of the anterior communicating artery

<table>
<thead>
<tr>
<th>Procedure</th>
<th>No. of Cases</th>
<th>Op. Deaths</th>
<th>Subsequent Death from Subarachnoid Hemorrhage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ligation of carotid artery</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Exploration only</td>
<td>2</td>
<td>0</td>
<td>1 (1 1/2 yrs. later)</td>
</tr>
<tr>
<td>Muscle or gelfoam packed around aneurysm</td>
<td>4</td>
<td>0</td>
<td>1 (gelfoam case, 4 wks. later)</td>
</tr>
<tr>
<td>Trapping</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ligature of aneurysmal neck with thread or clip (in 1 case aneurysm then excised)</td>
<td>15</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>2</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>

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ANEURYSMS OF THE ANTERIOR COMMUNICATING ARTERY

the anterior communicating artery and represents the entire unselected material of this classification from this clinic up to April 1952. Of these patients, 24 were subjected to surgery of one sort or another (Table 1). It is the purpose of this paper to review the problem of the surgical treatment of aneurysms located on the anterior communicating artery, and in light of our experiences and those of others, to assess which approach may be the most rational and at the same time most rewarding.

INCIDENCE

The incidence of intracranial aneurysms in the general population has been estimated up to about 1 per cent;19,22 and in almost all recorded series1,3,4,11,13,23,28 aneurysms of the anterior communicating artery represent somewhere between 20–25 per cent of them. The 26 aneurysms of the anterior communicating artery here recorded represent slightly over 20 per cent of all aneurysms recorded at the Serafiner clinic since 1932.

The importance of recognizing any specific problems presented by such a group is thus clear.

ETIOLOGY

Views as to the etiology of these “congenital” aneurysms have varied. Forbus22 felt that their development was caused by the absence of media at the bifurcation of the arteries which led to a weak point that gradually gave way under the constant pulsating pressure of the blood within at these points. In support of his theory was the high incidence of aneurysms at the points of bifurcation on the circle. It did not, however, explain those aneurysms that occurred not at all infrequently at a point along the course of a vessel and well away from its bifurcation, most notably those on the proximal part of the carotid and, more germane to our present discussion, at the midpoint of the anterior communicating artery.

On the basis of some very convincing investigations into the embryology of the circle of Willis, Dorcas Padget4 pointed out that the development of aneurysms could more logically be traced to weak points occurring at the sites of incomplete resolution of previously existing embryonic vessels. From the anterior communicating artery in the embryo, there arises a smaller median anterior cerebral artery. This normally disappears, but De Vries5 found it to be present in a large percentage of human embryos and called it the “median artery of the corpus callosum.” In adult man it may anomalously persist as a single anterior cerebral artery with usually a relative disappearance of the two normally well developed anterior cerebral arteries. In some vertebrates, this median artery normally persists. It is the incomplete resolution of this artery that may be the point of origin of the aneurysms of the anterior communicating artery. In any event, Padget’s investigations led Dandy to the belief that this embryological explanation was the more logical, and Bassett2 has recently re-emphasized the point of etiology as most likely “unresolved vestiges of a primitively normal circulatory system” as opposed to the theory of Forbus. The present authors