SIDE-TO-SIDE ANASTOMOSIS BETWEEN THE EXTERNAL
AND INTERNAL CAROTID ARTERIES
IN THE TREATMENT OF CAROTID INSUFFICIENCY*

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With the increased use of arteriography there has been opened to the
neurosurgeon an expanding potential field of usefulness in the treat-
ment of cerebrovascular diseases. A better understanding of the
pathology of cerebrovascular diseases and of the mechanisms by which symp-
toms arise, plus the development of better techniques for vascular surgery
have now equipped the neurosurgeon to investigate the possibilities for the
surgical treatment of thrombotic and embolic disease of the major vessels
supplying the brain. That this investigation is already well under way can
be seen by some of the papers appearing during the last few years.1,2,4,9–11,13
The present paper is an attempt to illuminate one small facet of the problem.

The most common type of arteriosclerosis to attack the carotid vessels
is atherosclerosis, which does not produce a generalized involvement of the
vessel wall but a segmental one. The limited area of involvement presents
an atherosclerotic plaque in the intima consisting of connective-tissue
proliferation and a deposit of lipids. Not only does the plaque grow by the
addition of more lipid material and connective tissue but there is formed on
its intimal surface a thin layer of blood clot which helps occlude the vessel.
Once the vessel is completely occluded, secondary thrombi form distally and
proximally,5 and may occlude the whole linear extent of the common and
internal carotid arteries. The length of time necessary for such clots to form
and to become organized seems to vary from one case to another in our ex-
perience.

COMPLETE OCCLUSION

Four persons were operated upon by us for complete occlusion of the
common or internal carotid artery. Some of the details of these 4 cases are
shown in Table 1. The first thing that strikes one about these patients is
that they are relatively young, and this needs emphasis so that one will be
looking for the disease in an age group not usually associated with arterio-
sclerosis. Another thing to note is that there is poor correlation between the
duration of symptoms and the apparent age of the clot exposed at operation.
But the clot exposed at operation is not the only one to be considered, for

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beyond the limits of exposure there may be other clot of a different age. In each of the 4 patients reported here we were able to remove the clot and atheroma exposed at operation and to restore the lumen of the exposed part of the vessel, yet in each instance there was an obstruction of the vessel at some point beyond our reach. Thus in no instance in which the internal carotid artery was completely obstructed could we establish a return flow of blood through the vessel from its intracranial end, nor could we secure a

**TABLE 1**

*Four cases of complete carotid occlusion treated by thrombectomy*

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Type of Onset</th>
<th>Time from Onset to Operation</th>
<th>Type of Clot Found</th>
<th>Site of Occlusion</th>
<th>Result of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. E.H.</td>
<td>50</td>
<td>Sudden</td>
<td>9 days</td>
<td>Black, semiorganized</td>
<td>Entire internal carotid</td>
<td>No improvement</td>
</tr>
<tr>
<td>2. J.R.</td>
<td>58</td>
<td>Sudden</td>
<td>44 days</td>
<td>Soft, black, partly organized</td>
<td>Entire internal and common carotid</td>
<td>No improvement</td>
</tr>
<tr>
<td>3. B.R.</td>
<td>45</td>
<td>Stuttering</td>
<td>14 days</td>
<td>Atheroma and soft organized clot</td>
<td>Distal part of common and entire internal carotid</td>
<td>No improvement</td>
</tr>
<tr>
<td>4. J.C.</td>
<td>52</td>
<td>Slowly progressive</td>
<td>1 year</td>
<td>Atheroma and organized clot</td>
<td>Internal carotid and part of distal common carotid</td>
<td>No improvement</td>
</tr>
</tbody>
</table>

flow from the aorta or innominate artery when the lower part of the common carotid was completely obstructed.

These 4 operations must therefore be counted as failures. It is hoped, however, that they will not serve to prevent further attempts at thrombectomy in this type of obstruction because such a small number of cases is too few from which to draw broad generalizations and they should rather be regarded as preliminary attempts at surgical treatment, recognizing that the field of vascular surgery is rather new to neurosurgeons. The thought arises that if one could operate upon atherothrombotic disease of the carotid vessels before the obstruction is complete one might be more successful, and that leads to the presentation of 2 more cases and the main theme of this paper.

**PARTIAL OCCLUSION**

In 1951 Miller Fisher suggested that if the carotid occlusion were confined to the region of the carotid bulb it should be possible to relieve it by anastomosing the external carotid artery or one of its branches to the internal carotid beyond the site of obstruction. Strully and his co-workers in 1953 made the same suggestion, but were unable to carry it out in their case because the obstruction was too high. In the past year we have had 2 patients who seemed to lend themselves to this procedure. Table 2 gives a brief summary of the data in these 2 cases. Figs. 1 and 2 show the findings on arteriography which demonstrated the narrowed lumen just above the bifurcation of the common carotid.

The surgical procedure consisted of making an oblique incision along the anterior border of the sternomastoid muscle to expose the distal part of the common carotid artery with its two terminal branches which were ex-