Mortality Abstract 200M-1

MORTALITY IN ASYMPTOMATIC PATIENTS WITH CAROTID BRUIT

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Reference

Objective of the Study
To determine the outcomes (death, cause of death, stroke, transient ischemic attack, or survival) in long-term follow-up of patients undergoing elective carotid artery surgery for asymptomatic internal carotid bruit due to an obstructive lesion, and to compare these with outcomes in another group of patients with asymptomatic carotid bruit not operated upon.

Subjects Studied
Out of 1,022 consecutive private patients subjected to carotid endarterectomy 1957-1977 at Baylor University Medical Center, Dallas, Texas, 132 had their operation for asymptomatic carotid bruit because of arteriographic evidence of 50% or greater obstruction of the diameter of one or both internal carotid arteries. There were 76 male and 56 female patients; the mean age of the operated group was 64.7 years, with a range of 42-82 years.

Another group was also evaluated for asymptomatic carotid bruit but, for various reasons, no operation was performed; this unoperated group was also followed to determine the natural history of this finding in untreated patients. Their mean age was 65.7 years, with a range of 39-86 years; 74 were men and 64 were women. Reasons for not operating included refusal of the patient or their physician to permit arteriography (57 patients), a soft unilateral bruit, arteriographic evidence that the obstruction was less than 50%, presence of multiple risk factors, or treatment of other disorders taking precedence. All patients in both groups were white.

Follow-Up
FU was reported as complete for all patients in both groups to November 15, 1977. The range of follow-up was from 6 to 200 months, and life table data for the two groups were detailed in author's Tables 4 and 5.

Table A

Comparative Mortality, Patients with Carotid Bruit, 1957-1979, With or Without Carotid Endarterectomy

<table>
<thead>
<tr>
<th>Interval</th>
<th>Alive at Start</th>
<th>Exposure Pt.-Yrs.</th>
<th>No. of Deaths</th>
<th>Mortality Ratio 1000/d'</th>
<th>Mean Ann Mort per 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start-End</td>
<td>Obs. d</td>
<td>Exp. d'</td>
<td>Obs. q</td>
<td>Expected q'</td>
<td>Excess (q' - q)</td>
</tr>
<tr>
<td>Yrs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5-1.0</td>
<td>132</td>
<td>63.2</td>
<td>9</td>
<td>2.15</td>
<td>420%</td>
</tr>
<tr>
<td>1-5</td>
<td>112</td>
<td>325.0</td>
<td>14</td>
<td>12.04</td>
<td>116</td>
</tr>
<tr>
<td>5-17</td>
<td>54</td>
<td>181.5</td>
<td>20</td>
<td>9.98</td>
<td>200</td>
</tr>
<tr>
<td>0.5-17</td>
<td>132</td>
<td>569.7</td>
<td>43</td>
<td>24.17</td>
<td>178</td>
</tr>
</tbody>
</table>

Operated—Endarterectomy

Yrs.

0-1 138 128.5 12 4.63 260 93 36 57
1-5 107 302.0 23 12.08 190 76 40 36
5-17 41 154.0 15 9.09 165 97 59 38
0-17 138 584.5 50 25.80 194 86 44 42

Not Operated

Yrs.

0-1 138 128.5 12 4.63 260 93 36 57
1-5 107 302.0 23 12.08 190 76 40 36
5-17 41 154.0 15 9.09 165 97 59 38
0-17 138 584.5 50 25.80 194 86 44 42

* Basis of expected deaths: 1969-71 U.S. Life Table Rates, M and F. Approximated first year q' from mean age + 2 years, and progression with duration 5% per year.
### Table B

Morbidity, Cerebrovascular Events, Unoperated Patients
Compared with Results after Endarterectomy, All Durations Combined

<table>
<thead>
<tr>
<th>Cerebrovascular Event</th>
<th>No. of Events</th>
<th>Exposure</th>
<th>Event Rate/1000/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unop. n</td>
<td>Operated n'</td>
<td>Unop. E</td>
</tr>
<tr>
<td>TIA (Trans. Isch.)</td>
<td>31</td>
<td>6</td>
<td>584.5</td>
</tr>
<tr>
<td>Non-Fatal Stroke</td>
<td>27</td>
<td>3</td>
<td>584.5</td>
</tr>
<tr>
<td>Fatal Stroke</td>
<td>3</td>
<td>3</td>
<td>584.5</td>
</tr>
<tr>
<td>All CV Events</td>
<td>61</td>
<td>12</td>
<td>584.5</td>
</tr>
</tbody>
</table>

**Expected Mortality**

The 1969-71 U.S. Life Table rates were used as the basis for expected mortality for Table A. As a decennial table, it conveniently provides detailed age- and sex-specific mortality rates from a time near the middle of the study period (1957-1977), permitting derivation of a first-year q' from the age and sex composition data reported. Since only mean-age was available, "mean-age + 2 years" was used for extracting tabular (decennial table) mortality rates. This is because a group's "true" mean q' tends to exceed "q for the mean age" by about this much of an age-adjustment (see ref. 2, p. 25). A period of two years rather than three was chosen for the adjustment factor because of the high mean age (about 65) and the broad age range (40-45 years). Advancement of q' by duration was 5% per year (see ref. 2, pp. 25-26 for rationale). In Table A, then, the operated group's mortality was compared to that expected for a group of comparable age/sex composition from a general U.S. population, and the unoperated group was compared to its own U.S. population reference group. First-year mortality for the operated group was annualized from the 6-month data reported by the authors.

In Table B, the operated group is used as the basis of expected morbidity and mortality, since it generally had the lower morbidity, and the unoperated group is the "observed" group. Two of the events reported are morbid, and one is mortal (fatal stroke), so this event table is a "complication table" showing a mixture of morbidity and mortality outcomes.

**Results**

Statistically significant (P < 0.01) differences in TIA and non-fatal stroke event-rates were found between operated and unoperated groups, with the operated group having more favorable outcomes by these measures. Interestingly, no statistically significant difference in fatal strokes emerged between the two groups.

**Comments**

A significant portion of the unoperated group (32%) did not have angiographic evaluation as part of their work-up. Thus, it is possible that some of the "mid-cervical bruits" clinically detected in this group did not, in fact, arise from the internal carotid artery. If a subset of the unoperated group did have more benign (e.g., external carotid) disease, then the differences observed between unoperated and operated groups in the study may have erred on the side of lowering the "true" event rate in the unoperated group.

Much of the study was conducted prior to the time when clinicians would serially follow asymptomatic bruits in their medically treated (unoperated) patients by means of doppler studies and other tests, and more of the "unoperated" group would be intercepted today and offered surgical intervention based on documented progression before neurologic complications. But the study reported serves as a useful natural history study for expectations in an unoperated group of the described composition.

**Other Reference**