Influence of Age on Carotid Atheroma in Patients with Reversible Ischemic Attacks

Gianluca Landi, Mario Guidotti, and Frida Valsecchi

To evaluate the influence of age on carotid atheroma we reviewed the angiographic findings in 120 patients with reversible ischemic attacks. The prevalence and severity of atherosclerotic lesions increased significantly with age, and this difference persisted after adjusting for hypertension. These results may at least partly explain the poor long-term prognosis for elderly subjects with reversible ischemic attacks, and underscore the importance of taking age into account when relating clinical and angiographic findings in patients with cerebrovascular ischemia. (Stroke 1987;18:43-45)

THROMBOEMBOLISM due to atheroma of the carotid artery in its extra- or intracranial segments is the commonly accepted pathogenesis of most cerebral ischemic attacks.1 On the other hand, the main risk factors for atherothrombotic stroke are advanced age and hypertension.2,3 Since the prevalence of hypertension increases with age,4 these two factors may not be independent in contributing to the occurrence of cerebral ischemia. Experimental and pathologic studies have shown that hypertension favors the onset and progression of cerebral atherosclerosis,5,6 but scarce data are available concerning the effect of age on presence and severity of carotid atheroma. In an attempt to evaluate this relation we reviewed the carotid angiograms of 120 patients with reversible ischemic attacks.

Subjects and Methods

We studied angiograms of the symptomatic carotid artery in 120 consecutive patients with transient ischemic attack or reversible ischemic neurological deficit (i.e., with complete regression within 24 hours or within 3 weeks). The decision to carry out angiography was independent of the presence of a carotid artery bruit. The examination was performed by the transfemoral route in 72% of the patients and by percutaneous carotid or right brachial artery injections in the others. Patients were divided into tertiles according to age: Group 1 included patients younger than 45 years (range, 16-44), Group 2 those aged 45-54 years, and Group 3 comprised patients older than 54 years (range, 55-70). Arterial hypertension was diagnosed when 2 pressure determinations exceeded 160/90 mm Hg or if antihypertensive drugs were regularly used.

The angiograms were reviewed by a neuroradiologist unaware of the patient’s age and blood pressure, and all visualized carotid arteries received a score related to presence and severity of atherosclerotic lesions along their course up to the C-1 portion, according to the following criteria: normal = 1, irregularity of the vessel lumen = 2, 10-50% stenosis = 3, 50-70% stenosis = 4, 70-99% stenosis = 5, complete occlusion = 6.

The \( \chi^2 \) test was used to evaluate the prevalence of pathologic vessels among the 3 groups, and analysis of variance to assess the difference between their scores. Proper log-logistic and log-linear models were used to adjust these results for the presence of hypertension within each group.

Results

All data concerning the 120 patients are summarized in Table 1. Fourteen (35.0%) of the 40 symptomatic carotid arteries in Group 1 had evidence of atheroma, with an average score (± SD) of 1.93 ± 1.64. In Group 2, atherosclerotic lesions were found in 27 vessels (67.5%), and their mean score was 2.77 ± 1.85. Among Group 3 patients, 33 carotid arteries were abnormal (82.5%), and their score was 3.17 ± 1.75. Forty-nine of the 120 patients were hypertensive: 12 in Group 1, 16 in Group 2, and 21 in Group 3; this trend did not reach statistical significance (\( \chi^2 = 4.21; p<0.01 \)). The result of statistical analysis revealed that the progressive increase in the prevalence of lesions was highly significant (\( \chi^2 = 14.7; p<0.0002 \)), even after adjusting for the presence of hypertension (\( p<0.001 \)). Analysis of variance of the angiographic scores demonstrated a significant difference among the 3 groups (\( F = 8.4; p<0.001 \)), which was only modestly affected by correction for hypertension (\( p<0.01 \)).

Discussion

Although the incidence of cerebral ischemic attacks is strikingly related to age, surprisingly few studies have examined the influence of this factor on the prevalence of carotid atheroma. In their report on autopsy populations, Baker et al7 found a remarkable increase in the frequency and amount of cerebral atherosclerosis with advancing age, but they investigated only the circle of Willis and not the extracranial vessels. Poser et al8 observed “a definite increase of incidence of demonstrable occlusive or obstructive lesions... with advancing age” in 250 patients with cerebrovas-
Table 1. Data Summary

<table>
<thead>
<tr>
<th></th>
<th>Group 1 (n = 40)</th>
<th>Group 2 (n = 40)</th>
<th>Group 3 (n = 40)</th>
<th>Statistical analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (range)</td>
<td>16–44 yrs</td>
<td>45–54 yrs</td>
<td>55–70 yrs</td>
<td></td>
</tr>
<tr>
<td>Males: Females</td>
<td>27:13</td>
<td>30:10</td>
<td>33:7</td>
<td></td>
</tr>
<tr>
<td>TIA: RIND*</td>
<td>22:18</td>
<td>17:23</td>
<td>16:24</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 49 (40.8%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:1 (30.0%)</td>
<td>16:1 (40.0%)</td>
<td>21:1 (52.5%)</td>
<td></td>
</tr>
<tr>
<td>Symptomatic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>atherosclerotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>carotid arteries</td>
<td>14:1 (35.0%)</td>
<td>27:1 (67.5%)</td>
<td>33:1 (82.5%)</td>
<td></td>
</tr>
<tr>
<td>Score of lesions</td>
<td>1.93 ± 1.64</td>
<td>2.77 ± 1.85</td>
<td>3.17 ± 1.75</td>
<td></td>
</tr>
<tr>
<td>(mean ± SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*TIA, transient ischemic attack; RIND, reversible ischemic neurological deficit.
†After adjusting for the presence of hypertension, χ² = 11.07 p < 0.001, and F = 6.2 p < 0.01.

References


KEY WORDS • cerebral ischemia • reversible ischemic attacks • cerebral angiography • atherosclerosis
Influence of age on carotid atheroma in patients with reversible ischemic attacks.
G Landi, M Guidotti and F Valsecchi

*Stroke*. 1987;18:43-45
doi: 10.1161/01.STR.18.1.43

*Stroke* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 1987 American Heart Association, Inc. All rights reserved.
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://stroke.ahajournals.org/content/18/1/43

**Permissions**: Requests for permissions to reproduce figures, tables, or portions of articles originally published in *Stroke* can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

**Reprints**: Information about reprints can be found online at:
http://www.lww.com/reprints

**Subscriptions**: Information about subscribing to *Stroke* is online at:
http://stroke.ahajournals.org/subscriptions/