The Evolution of Carotid and Coronary Artery Disease After Operation for Carotid Stenosis

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We followed 278 consecutive patients undergoing carotid artery surgery between January 1985 and December 1989 using a computerized surveillance program file with automatic carotid and coronary artery follow-up investigations every six months. Combined postoperative neurologic mortality and morbidity was 1.7%. During the mean follow-up period of 30 months, 10 patients died, four due to myocardial infarction. Actuarial rates of survival and freedom from cerebral vascular accidents at 36 months were 94% and 95.8%, respectively. No fatalities due to cerebral vascular accidents occurred during follow-up. Eleven patients had myocardial infarction, an actuarial rate of 6% at 36 months; 18 patients experienced angina pectoris, while seven sustained silent electrical myocardial ischemia. Findings on myocardial angioscintiscans and coronary artery arteriograms led to four aortocoronary bypasses and seven percutaneous coronary artery dilatations. Duplex scanning documented three asymptomatic carotid restenoses of > 80%, which were operated upon, and 32 contralateral carotid artery stenoses ranging between 80% and 99%, 24 of which were asymptomatic. Twenty-eight patients underwent secondary contralateral carotid artery revascularization. No one with contralateral carotid artery stenosis < 80% experienced a carotid artery ischemic event. These results clearly show the value of cardiac and neurologic surveillance of patients operated on for carotid artery stenosis. (Ann Vasc Surg 1992;6:408—412).

KEY WORDS: Carotid artery stenosis; carotid endarterectomy; coronary artery disease; neurologic complications; computerized surveillance programs; myocardial infarction.

According to Hertzer and Arison [1], 27.4% of patients who undergo carotid artery endarterectomy will die of myocardial infarction (MI) and 12.5% of a cerebral vascular accident (CVA) within 10 years after operation. The actuarial CVA rate in these patients is 26.3% at 10 years [1] and most of these are due to progression of contralateral carotid artery disease. Complications of coronary artery disease are therefore the principal cause of mortality in patients undergoing carotid artery endarterectomy, and most of the late postoperative neurologic complications in this setting are due to progression of lesions in the contralateral carotid artery.

Based on the outcome and the results of a regular follow-up program for patients operated upon for carotid artery disease during these last five years, the objectives of this study were to determine:
1) the incidence and the severity of coronary artery complications; 2) the natural history of the operated and contralateral carotid arteries; and 3) the efficacy of regular cardiac and carotid artery duplex scanning surveillance in this setting.

PATIENTS AND METHODS

Between January 1985 and December 1989, 278 consecutive patients underwent a carotid revascularization procedure. There were 232 men (83%) and 46 women (17%) whose mean age was 67.3 ± 9.3 years. A transient ischemic attack (TIA) led to the discovery of carotid artery disease in 180 patients (65%), while 38 (13%) patients had experienced a partially reversible hemispheric CVA. Sixty patients (22%) were asymptomatic and carotid artery disease was disclosed during work-up for peripheral artery occlusive disease. The mean follow-up period for these patients was 30 months.

Assessment of coronary artery disease

The surveillance program included history taking, clinical examination, and resting and exertional electrocardiograms performed by the patient’s cardiologist. Beginning in 1988, myocardial thallium scintiscans with dipyridamole potentialization were obtained whenever clinical symptoms (progressive angina, residual angina following infarction) or electrical manifestations (repolarization disorders with depressed ST segment or negative T waves) were observed.

Carotid artery assessment

At each visit, duplex scanning of both carotid and vertebral arteries was performed. The initial examination was carried out immediately postoperatively, then every six months during the first three years, and every year thereafter.

All patients were followed by a software program which automatically generated prescriptions for cardiology and vascular investigations. Actuarial rates of survival as well as cardiology and neurologic events were calculated with this data bank. Actuarial curves were compared using the log rank test.

RESULTS

Hospital mortality and morbidity

Three patients died, all of MI (1%) while two patients experienced a nonfatal CVA due to occlusion of the operated carotid artery (0.7%), i.e. a combined postoperative mortality and morbidity rate of 1.7%.

Late deaths

Fourteen patients (5%) were lost to follow-up. Actuarial survival at 36 months was 94 ± 4.1% (Table I). Ten patients died, four of MI. All four patients were less than 55 years old. None of the other patients died of fatal CVA during the follow-up period.

Coronary artery events

Thirty-six patients (11%) experienced a coronary artery event (11%). Eleven patients sustained MI (Table II) for a 36 month actuarial rate of MI of 6 ± 3.3%.

Eighteen patients had clinical manifestations associated with coronary artery insufficiency while seven patients had asymptomatic myocardial ischemia disclosed by electrocardiographic recordings. Coronary artery involvement was confirmed in these 25 patients

<table>
<thead>
<tr>
<th>Months</th>
<th>Patients</th>
<th>Infarction</th>
<th>Excluded</th>
<th>Lost to follow-up</th>
<th>Actuarial disease-free rate*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–6</td>
<td>278</td>
<td>2</td>
<td>26</td>
<td>3</td>
<td>99.2 (1.1)</td>
</tr>
<tr>
<td>7–12</td>
<td>247</td>
<td>2</td>
<td>21</td>
<td>2</td>
<td>98.4 (1.5)</td>
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<tr>
<td>13–18</td>
<td>222</td>
<td>2</td>
<td>32</td>
<td>0</td>
<td>97.4 (2.1)</td>
</tr>
<tr>
<td>19–24</td>
<td>188</td>
<td>4</td>
<td>37</td>
<td>2</td>
<td>95 (3.1)</td>
</tr>
<tr>
<td>25–36</td>
<td>145</td>
<td>1</td>
<td>99</td>
<td>7</td>
<td>94 (3.3)</td>
</tr>
</tbody>
</table>

*Actuarial disease-free rate corresponding to percentage of patients without myocardial infarction; 95% confidence interval is given between parentheses.