Internal Carotid Artery Dissection in a Community
Rochester, Minnesota, 1987-1992
Wouter I. Schievink, MD; Bahram Mokri, MD; Jack P. Whisnant, MD

Background and Purpose: Cervical internal carotid artery dissections are diagnosed with an increasing frequency, but reliable epidemiologic data are not available. The aim of this study was to determine the incidence rate of spontaneous cervical internal carotid artery dissection in a defined population.

Methods: Using the medical record linkage system used for epidemiologic studies in Rochester, Minn, all patients diagnosed with spontaneous cervical ICA dissection for 1987 through 1992 were identified.

Results: A total of 10 patients with spontaneous cervical internal carotid artery dissection (6 women and 4 men; mean age, 44 years) were identified. For the period 1987 through 1992, the average annual incidence rate for all ages was 2.6 per 100,000 (95% confidence intervals, 0.9 to 4.2).

Conclusions: This study, for the first time, provides incidence rates for spontaneous cervical internal carotid artery dissections. No diagnoses were made before 1987, probably reflecting an increased awareness of the disorder among physicians. (Stroke. 1993;24:1678-1680.)

Key Words • carotid artery diseases • dissection • epidemiology

It is well recognized that dissections of the cervical internal carotid artery (ICA) may cause ischemic stroke or transient ischemic attacks (particularly in young patients in terms of stroke age), unilateral head or neck pain, oculosympathetic palsy, pulsatile tinnitus, and cranial nerve palsies.1-6 ICA dissection may occur spontaneously or after obvious blunt or penetrating trauma to the neck.5,4,7 Occasionally there is a history of a trivial predisposing event.8 In the past two decades a number of case reports as well as series of patients have provided significant information regarding the clinical features, angiographic and other imaging aspects, and prognosis for these dissections.1,4,9 However, reliable epidemiologic data are not available. All of the reported series have been from referral medical centers. In the present study we examined the occurrence of spontaneous ICA dissection in a defined population.

Subjects and Methods
The unique features of the medical record linkage system used for epidemiologic studies in Rochester, Minn, have been described previously.10-13 The medical services in Rochester are provided almost entirely by the Mayo Clinic and affiliated hospitals and one smaller group practice, the Olmsted Medical Group and an affiliated hospital. Diagnoses of all local residents receiving care at medical facilities in and around Rochester are coded into a computer file. This ensures virtually complete ascertainment of all diagnosed cases in the population, including diagnoses made at autopsy. Using this computerized and coded diagnostic index, all residents of Rochester who received a diagnosis of ICA dissection during the 18-year period between January 1, 1975, and December 31, 1992, were identified. Patients with a history of trauma were not included. Patients who had been a resident of Rochester less than 1 year before the onset of symptoms were also excluded, ensuring that individuals who may have moved to Rochester because of their illness would not be counted.

For calculating incidence rates, the entire population of Rochester was considered to be at risk. The population of Rochester at census increased from 57,890 in 1980 to 70,745 in 1990.

Results
Before 1987 no cases of spontaneous cervical ICA dissection were diagnosed among residents of Rochester. Ten residents of Rochester who had suffered a spontaneous dissection of the extracranial ICA were identified from 1987 through 1992. These patients were diagnosed during this 6-year period at a rate of one to three per year. Average annual incidence rates were calculated from 1987 through 1992 and were age- and sex-adjusted to the 1990 US white population.

The average annual incidence for all age groups was 2.6 per 100,000 population (95% confidence interval [CI], 0.9 to 4.2). The average annual incidence for those aged 20 years and older was 3.5 per 100,000 population (95% CI, 1.3 to 5.8).

Clinical and imaging characteristics of the 10 patients are presented in the Table. The mean age of the 6 women and 4 men was 44 years. All had head or neck pain. Five patients presented with cerebral or retinal ischemic symptoms; 3 patients suffered an ischemic...
stroke, 1 transient cerebral ischemic attack, and 1 amaurosis fugax. Oculosympathetic palsy was noted in 4 patients. One patient with a known carotid bruit experienced unilateral headaches and tinnitus. Unilateral headache was the only manifestation of the ICA dissection in 1 patient.

The diagnosis of dissection was made with angiography in 7 patients, with magnetic resonance imaging (MRI) only in 2 patients, and with ultrasound in 1 patient. Although we are reluctant to make a diagnosis of ICA dissection on the basis of an ultrasound study alone, the demonstration of a double lumen in this patient was so characteristic that further confirmation of the diagnosis was not pursued. No autopsy cases of spontaneous cervical ICA dissection were found.

One patient was found to have bilateral cervical ICA dissections. In addition, luminal irregularities were noted in the distal cervical segment of a contralateral ICA in one patient and in a vertebral artery in another patient. Whether these angiographic changes represented residuals of previous dissection or were indicative of some form of active arteriopathy was not clear.

Follow-up ranged from 6 months to 5 years. Two of the three patients with ischemic stroke made a complete recovery and were asymptomatic at the time of last follow-up. One patient has persistent mild dysphasia and hemiparesis but has recovered to the point that she is able to resume her previous employment on a part-time basis. Headaches essentially resolved in all patients. Recurrent arterial dissections were not observed.

Discussion

Spontaneous ICA dissections, although not rare, are uncommon. This was reflected in the relatively small number of cases that were diagnosed in the Rochester community during the study period. These patients constitute less than 5% of the total number of patients with spontaneous ICA dissection seen at the Mayo Clinic as a referral center.

We found the average annual incidence of spontaneous ICA dissection for all age groups to be 2.6 per 100,000 population. This compares with about 10 per 100,000 for aneurysmal subarachnoid hemorrhage.13

Spontaneous dissections of the cervical ICA in referral patients have been diagnosed at our institution on a regular basis since the early 1970s.14 However, this is an uncommon disorder with diverse clinical manifestations. It is likely that angiographically or particularly clinically the entity of spontaneous cervical ICA dissection was not fully appreciated in our community until the early to mid 1980s.15,16 This may have contributed to the absence of diagnoses before 1987. Additionally, in the last few years, MRI and magnetic resonance angiography (MRA)17,18 have provided the opportunity to image patients with relatively subtle signs and symptoms of ICA dissection, who may have remained undiagnosed in the past because the paucity of clinical manifestations probably may not have warranted arteriography. Spontaneous ICA dissection was therefore probably underdiagnosed in this community before 1987. It is not likely that there has been an increase in incidence, but that possibility cannot be excluded.

Reliable epidemiologic data on the occurrence of spontaneous ICA dissections had not been available. Estimates of the proportion of ICA dissection in groups of patients with cerebrovascular disease have shown considerable variation, mainly reflecting the thoroughness of the investigative procedures, the stringency of the diagnostic criteria for arterial dissection, the inclusion of traumatic cases, the distribution of anterior and posterior circulation stroke, and the referral-based nature of the study population.

Biller and colleagues19 reviewed the cerebral angiograms of 4531 patients with acute cerebrovascular symptoms seen at a tertiary care hospital. Spontaneous cervical ICA dissection was diagnosed in 6 patients (0.13%) and traumatic cervical ICA dissection in 4 (0.09%).19 In a clinical series of 1200 consecutive patients with first ischemic stroke, Bogousslavsky et al20 noted extracranial ICA occlusion believed to be due to spontaneous dissection in 30 patients (2.5%). Although not community-based, this study did consist of a relatively unselected population of stroke patients, since

<table>
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<tr>
<th>Age, y/Sex</th>
<th>Year of Diagnosis</th>
<th>Method of Diagnosis</th>
<th>Location of Dissection</th>
<th>Signs/Symptoms</th>
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<tr>
<td>52/F</td>
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<td>L ICA stenosis and aneurysm</td>
<td>Headache</td>
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<td>Headache, amaurosis fugax</td>
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<td>1988</td>
<td>Angiogram</td>
<td>L ICA stenosis</td>
<td>Headache, stroke, OSP</td>
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<td>L ICA occlusion*</td>
<td>Headache, stroke</td>
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<td>L ICA occlusion</td>
<td>Headache, stroke, bruit</td>
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<tr>
<td>49/M</td>
<td>1992</td>
<td>MRI/MRA</td>
<td>L ICA stenosis</td>
<td>Headache, OSP</td>
</tr>
</tbody>
</table>

ICA indicates internal carotid artery; L, left; R, right; OSP, oculosympathetic palsy; TIA, transient ischemic attack; MRI, magnetic resonance imaging; and MRA, magnetic resonance angiography.

*Resolution of occlusion on follow-up MRA.
their hospital was the only acute care facility in their geographic area. Clearly, however, many patients with ICA dissection do not present with ischemic stroke or transient ischemic attacks.

Extracranial ICA dissection as a cause of ischemic stroke is distinctly more common in young and middle-aged patients than in older patients. Adams et al. reported on 144 patients between 15 and 45 years of age with ischemic stroke, 95 of whom underwent angiography; 8 (5.6%) were found to have suffered "arterial dissection." In a group of 148 patients aged 5 to 40 years who underwent angiography for ischemic stroke, Lisovski and Rousseaux diagnosed spontaneous cervical ICA dissection in 12 patients (8.1%). Among 137 patients between 16 and 40 years of age with ischemic stroke reported by Cronqvist et al., 98 underwent angiography, and spontaneous cervical ICA dissection was noted in 14 patients (10.2%). In a group of 112 patients with ischemic stroke aged 9 to 45 years, Gautier et al. found evidence for spontaneous cervical ICA dissection in 14 patients (12.5%) and for traumatic cervical ICA dissection in 7 (6.3%). Bogousslavsky and Regli diagnosed spontaneous ICA dissection in 8 of 41 (19.5%) patients between the ages of 16 and 29 years who underwent angiography for ischemic stroke.

In accordance with our overall experience, ischemic cerebrovascular disease and oculosympathetic palsy associated with head or neck pain were the most common manifestations of ICA dissection; there was no mortality, and the clinical course was generally benign. In one patient headache was the only symptom of ICA dissection. It is likely that with the increasing availability and sensitivity of MRI and MRA as well as a heightened index of suspicion, an increasing number of patients with ICA dissection will be detected, especially those with subtle clinical manifestations of the disease. The presently reported incidence figures are likely to be an underestimation of the true incidence of spontaneous ICA dissection.

References
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