Acute Stroke in the Very Elderly
Epidemiological Features, Stroke Subtypes, Management, and Outcome in Martinique, French West Indies

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Background and Purpose—Stroke incidence increases with increasing age and has an impact on daily living in many areas. With increasing life expectancy, old people will constitute the majority of stroke victims. We present the first stroke study focusing on very old patients in a black Caribbean population (Martinique, French West Indies).

Methods—All Martinican patients suffering from their first-ever stroke during 1 calendar year between June 1, 1998, and May 31, 1999, were included. Epidemiological, clinical, neuroimaging, management, and outcome data during the first month were collected and compared between very old patients (≥85 years) and patients aged <85 years.

Results—One hundred patients aged ≥85 years and 480 patients aged <85 years were included (sex ratio, women/men, 2.84 and 0.85, respectively; mean ± SD age, 88.8 ± 3.6 and 65.8 ± 13.3 years, respectively). The incidence of first-ever stroke was 1.64/1000 per year in the Martinique population and 18.2/1000 per year in patients aged ≥85 years. Elderly patients showed a significantly lower proportion of diabetes (19.1% versus 32.2%; P=0.012) and smoking (0% versus 8.4%; P=0.004) and a higher proportion of peripheral artery disease (23.4% versus 11.4%; P=0.002). Prevalence of hypertension was identical in the 2 groups (70%). There were no significant differences in stroke types or ischemic stroke subtypes between the 2 groups. Active medical care was poorer in older than in younger patients (hospitalization rate, 8% versus 94.4%; admission to neurological ward, 8% versus 23.8%; rate of performance of a CT scan, 82% versus 94%). The 30-day case fatality rate was approximately twice as high in elderly patients (31% versus 16.7%; P=0.009), and disability (Rankin Scale score ≥3) in survivors was markedly higher (78% versus 48%; P<0.0001).

Conclusions—In Martinique, the incidence of first-ever stroke in very old black Caribbean patients seems similar to that in white patients. They have the same pathological type and subtype of stroke as do young patients. The poorer stroke outcome found in the elderly during the first month may be related in large part to less active management than in younger patients. (Stroke. 2003;34:1593-1597.)

Key Words: blacks ■ elderly ■ epidemiology ■ stroke ■ stroke management

Aging is the most important independent risk factor for stroke but is obviously not a modifiable factor. For each successive 10 years after age 55 years, the stroke rate more than doubles in both men and women. With increasing life expectancy, the world is facing a rapid expansion in its elderly population, and old subjects will constitute the majority of stroke victims. Young and old age groups have different risk profiles and stroke features. In the elderly, stroke outcome data such as 30-day case fatality rate and disability are poorer than in young patients, and hospital management is often less active in this age group.

To provide a better outcome for old stroke patients, we need to assess stroke and management features in the elderly. Few studies have reported data on very old subjects aged ≥85 years, and only 1 study has focused on white stroke patients in this age group. In very old black stroke patients, no study is yet available. On the basis of our findings in ERMANCIA (Etude Réalisée en Martinique et Centrée sur l’Incidence des Accidents Vasculaires Cérébraux), our recent study of stroke incidence and outcome in a black Caribbean population in Martinique, French West Indies, we compared incidence, risk factors, stroke features, medical management, and outcome at 30 days in patients aged ≥85 years and patients aged <85 years.

Subjects and Methods
The methodology of ERMANCIA has been reported in detail previously. Briefly, ERMANCIA was a community-based epidemiological study of incidence and outcome of acute cerebrovascular diseases in Martinique. The methodology was based on recent recommendations on this topic. The registration of patients began on June 1, 1998, and continued until May 31, 1999. The population in Martinique at the 1999 census...
was 381 427, including approximately 360 000 French Afro-Caribbean persons. All incident cases of stroke (“first-ever-in-a-lifetime” and recurrent stroke) occurring during the study period were registered. Any patient who might have had a cerebrovascular event was visited as soon as possible by one of us, whether or not he was hospitalized. All clinical and laboratory data were reported on a special form, including personal data, vascular risk factors, and Barthel Index between days 5 and 9 after stroke. Our cases were classified as follows: definite and probable cerebral infarction, intracerebral hemorrhage (ICH), subarachnoid hemorrhage (SAH), and undetermined stroke. Definite and probable infarctions were further subdivided according to the Oxfordshire Community Stroke Project classification into 4 subtypes: total anterior circulation infarction (TACI), partial anterior circulation infarction (PACI), lacunar infarction (LACI), and posterior circulation infarction (POCI). This classification had a clinical basis, but a reallocation by CT scan was done every time that it was needed. All included cases were followed up prospectively. The date of eventual death and the cause of death were recorded. Death due to direct cardiovascular causes was classified as having occurred in the study period. The proportions of pathological types and subtypes of stroke were included in the study. A total of 973 patients with suspected stroke or transient ischemic attack (TIA) were notified to the study. After clinical assessment by a study investigator, 580 of the 973 subjects (295 women and 285 men) were considered as having a first-ever stroke during the study period. Patients were divided into 2 groups on the basis of age ($\geq$ 85 years and < 85 years). Incidence, clinical and neuroimaging features, and management and outcome data during the first month were compared between the 2 age groups.

### Statistical Analysis

The incidence of stroke is expressed as the number of first-ever strokes per 1000 persons per year with corresponding 95% CI. Sex- and age-specific incidence rates were adjusted to the French population in 1999 by the direct method, and the comparison with different studies was performed by direct standardization to the European population. The 2 age groups were compared. Univariate analyses were performed, and significance was judged on the basis of the $\chi^2$ test for categorical variables and the Mann-Whitney test for continuous variables. A value of $P<0.05$ was considered significant.

### Results

During the 1-year study period, 580 patients with first-ever stroke were registered. One hundred (17.24%) were aged $\geq$ 85 years, and 480 (82.76%) were aged < 85 years. Mean ages and sex ratios (women/men) were 88.8±3.6 and 65.8±13.3 years and 2.84 and 0.85 for the older and younger groups, respectively ($P<0.0001$). The traditional risk factors in the 2 age groups are summarized in Table 1. The crude annual incidence of first-ever stroke in the whole population was 1.64/1000 per year (95% CI, 1.51 to 1.77). World- and Europe-standardized incidence values were 1 (95% CI, 0.91 to 1.09) and 1.51 (95% CI, 1.39 to 1.64), respectively. The crude annual incidence of first-ever stroke in very old people ($\geq$ 85 years) was 18.2/1000 per year (95% CI, 14.63 to 21.77). We found a high prevalence of arterial hypertension in both groups. Older patients more frequently had peripheral artery disease and TIA and less frequently had diabetes mellitus and smoking habits.

The proportions of pathological types and subtypes of first-ever stroke were similar in the 2 groups and are shown in Table 2. We found a higher frequency of coexisting asymptomatic lesions on CT scan in the oldest patients (47.7% versus 25.3%; $P<0.0001$). Types and proportions of coexisting asymptomatic lesions were similar in the 2 groups (lacunar infarcts, 63% versus 61%; leukoaraisosis, 55% versus 59%; lacunar infarcts plus leukoaraisosis, 17% versus 15%; silent infarcts, 5% versus 8%, for patients aged < 85 and $\geq$ 85 years, respectively). Management and outcome features were markedly different between the 2 age groups and are detailed in Tables 3 and 4, respectively.

### Discussion

In our study the proportion of very old subjects among all patients with first-ever stroke reached 17% and will certainly rise in the future with increasing life expectancy. The incidence rate of stroke increased constantly with increasing age, even at $\geq$ 85 years. The incidence rate of first-ever stroke in very old subjects was 18.2/1000 per year. Previous studies showed important variations in first-ever stroke incidence for the most elderly (Table 5). This variation may be real because of differences in the detection and management of risk factors. Generally, the older group studied in black patients with stroke is aged $\geq$ 75 years. We found only 1
study on stroke incidence in a black population aged ≥85 years, which reported a high stroke incidence (64.1/1000) in South London, but the statistical analysis was performed on a very small sample (5 patients). As in many studies, we report a higher incidence in men than in women in all age groups except the elderly.

Arterial hypertension had a high prevalence, similar to that found in US black patients, and was equally common in both age groups. Diabetes mellitus and smoking were statistically more frequent in younger patients than in older ones; this finding strongly suggests the recent westernization of lifestyle in Martinique. Emergence of these 2 vascular risk factors in young patients could contribute in the future to increase stroke incidence in the old population. Coronary disease and atrial fibrillation showed a trend toward being higher in old patients, but this was without statistical significance. The low frequencies of such cardiac stroke risk factors found in our black population are in accordance with the study of Arboix et al, rates of ICH were very close in the 2 age groups (12% and 14.8%, respectively, in patients aged ≥85 years and patients aged <85 years). Previous studies have found a higher prevalence of TACI subtype in elderly than in younger patients, which has been assigned to a higher rate of atrial fibrillation. However, as in our study, some authors have also shown that the black stroke population suffered significantly less atrial fibrillation than did whites. These data may explain the relatively low rate of TACI found in our older ischemic stroke group. We found a lower rate of undetermined stroke than in many previous studies. This is likely related to the high proportion of CT scans obtained within 30 days in our study, even in very old patients. We did not find SAH in the elderly group. These results are consistent with those of the studies of Bamford et al and Ellekjaer et al, in which only 1 SAH was noted in 89 and 91 stroke patients aged ≥85 years, respectively. The very low rate of SAH in the elderly raises the question of the difficulty of collecting data on such patients, who often die rapidly at home and therefore are not included in death certificate searches. Subtypes of ischemic stroke were very similar in the 2 groups. Lacunar infarcts accounted for 19% of all stroke in the older group, which is slightly higher than in the hospital-based study of Arboix et al (15%). Thus, age does not seem to influence stroke type and ischemic stroke subtype distribution except for SAH.

### Table 3. Management Features in the 2 Age Groups

<table>
<thead>
<tr>
<th></th>
<th>Patients Aged ≥85 Years (n=100)</th>
<th>Patients Aged &lt;85 Years (n=480)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital management (%)</td>
<td>89 (89)</td>
<td>453 (94.4)</td>
<td>0.048</td>
</tr>
<tr>
<td>Mean delay from onset of symptoms to hospital admission (SD, d)</td>
<td>0.7±2.3</td>
<td>1.4±7.95</td>
<td>0.066</td>
</tr>
<tr>
<td>Management in the Department of Neurology (%)</td>
<td>7/89 (8)</td>
<td>108/453 (23.8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Realization of a CT scan (%)</td>
<td>82 (82)</td>
<td>454 (94)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean delay of realization of first CT scan (SD, d)</td>
<td>5.2±5.06</td>
<td>4.1±5.52</td>
<td>0.003</td>
</tr>
<tr>
<td>Realization of a second CT scan (%)</td>
<td>8 (8)</td>
<td>105 (22)</td>
<td>0.003</td>
</tr>
<tr>
<td>Mean hospital of stay in survivors (SD, d)</td>
<td>22.4±12.3</td>
<td>24.5±13.1</td>
<td>NS</td>
</tr>
<tr>
<td>Management in a physiotherapy center after hospital discharge in survivors (%)</td>
<td>12/60 (20)</td>
<td>74/382 (19.4)</td>
<td>NS</td>
</tr>
</tbody>
</table>

### Table 4. Outcome Features in the 2 Age Groups During the First Month

<table>
<thead>
<tr>
<th></th>
<th>Patients Aged ≥85 Years (n=100)</th>
<th>Patients Aged &lt;85 Years (n=480)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barthel Index between 5th and 9th day, mean±SD</td>
<td>46.1±32</td>
<td>70.8±33</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Death (%); 95% CI</td>
<td>31 (31; 25–37)</td>
<td>80 (16.7; 15.2–22.7)</td>
<td>&lt;0.0009</td>
</tr>
<tr>
<td>Direct neurological damage as presumed cause of the death (%)</td>
<td>21/31 (67.7)</td>
<td>60/80 (75)</td>
<td>0.039</td>
</tr>
<tr>
<td>Proportion of Rankin Score ≥3 among survivors (%)</td>
<td>54/69 (78)</td>
<td>192/400 (48)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Proportion of Rankin Score &lt;3 among all stroke patients (%)</td>
<td>14 (14)</td>
<td>206 (43)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
TABLE 5. Incidence Rates for First-Ever Stroke in Population Aged ≥85 Years: Ideal Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Origin</th>
<th>Incidence Rate, 1000/Year (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Söderhamn (Sweden)11</td>
<td>1975–78</td>
<td>White</td>
<td>30.5</td>
</tr>
<tr>
<td>Oxford (UK)12</td>
<td>1986</td>
<td>White</td>
<td>19.8 (15.8–23.9)</td>
</tr>
<tr>
<td>Umbria (Italy)13</td>
<td>1987</td>
<td>White</td>
<td>23.7 (14.8–38)</td>
</tr>
<tr>
<td>Innherd (Norway)14</td>
<td>1995</td>
<td>White</td>
<td>30.4 (24.4–38)</td>
</tr>
<tr>
<td>South London (UK)16</td>
<td>1996</td>
<td>Black</td>
<td>64.1 (20.8–149.6)</td>
</tr>
<tr>
<td>South London (UK)16</td>
<td>1996</td>
<td>White</td>
<td>17.93 (14.4–22.1)</td>
</tr>
<tr>
<td>Arcadia (Greece)16</td>
<td>1999</td>
<td>White</td>
<td>26.6 (22–31.1)</td>
</tr>
<tr>
<td>Martinique (FWI)</td>
<td>1999</td>
<td>Black</td>
<td>18.2 (14.6–21.8)</td>
</tr>
</tbody>
</table>

Substantial differences in the management of stroke between older and younger patients were found in our study. Very old patients were less frequently hospitalized than those aged <85 years (89% versus 94.4%). However, we have shown that a great proportion of stroke patients were admitted to the hospital, including the elderly. This is consistent with the French medical practice in regard to stroke and is dramatically different from the practice in many countries such as the Netherlands, where a rate of hospitalization of <50% in stroke patients aged ≥85 years has been reported by Bots and colleagues. Approximately two thirds of hospitalized patients in each group were admitted in the university hospital of Fort-de-France. However, older patients were admitted to neurological wards 3 times less often than younger patients. In addition, the rate of CT scan performance within 30 days in the older group was significantly lower and the median delay in CT scan performance was higher than in the younger group. The rate of performance of a second CT scan in the first month was much lower in the oldest stroke patients (8% versus 22%). These management data suggest that elderly stroke patients are at risk of receiving suboptimal care since studies have shown that functional outcome was better in old patients treated in the Department of Neurology than those treated in the Department of Medicine.

Outcome features were poorer in the oldest patients. The 30-day case fatality rate was twice as high in patients aged ≥85 years (31% versus 16.7%). These rates are similar to those reported in the hospital-based study of Arboix et al (27% versus 13.5%) and in the population-based study of Vemmos et al (38% versus 23%). Among survivors, patients aged ≥85 years were more dependent at 30 days than patients aged <85 years (78% versus 48%). The severity of stroke in this older age group is also illustrated by the very low proportion of independent subjects among all stroke patients at 30 days, which reached only 14%. Severe stroke type and subtype, such as ICH and TACI, were similar in the 2 groups and cannot explain the outcome differences found in our study. Several factors may lead to poorer outcome at 1 month in the elderly. The proportion of deaths due to direct neurological damage was high in both groups and may be overestimated in our study. However, the presumed cause of death was less often related to direct neurological damage in older patients; this suggests that complications such as cardiac and respiratory events occurred more frequently after stroke. This is consistent with the likely poorer health and functional status before stroke in the older group. No data were obtained in our study on prestroke functional status; this constitutes a bias for poststroke disability analysis. However, we believe that a poorer functional status before stroke in very old patients is not sufficient to explain the strong difference found between the 2 groups in regard to poststroke disability. Moreover, only first-ever-in-a-lifetime strokes have been included, and thus a high proportion of patients who were independent before stroke have been selected. Finally, in addition to poorer health and prestroke disability, the less intensive management of stroke in the elderly, as shown in our study, may contribute to the poorer outcome in this age group. This constitutes a paradox because studies have shown that older stroke patients, who generally have a poor clinical prognosis, benefit more from active medical care than younger patients. Stroke management appears to be one of the most important modifiable prognostic factors in older patients, and we believe that a special effort must be made to improve medical care in this older age group.

Conclusions

In Martinique, the proportion of stroke patients who are very old is close to 20%, and we assume that this rate will rise in the future with increasing life expectancy and westernization of habits. In our study significant differences were found between very old patients and those aged <85 years in terms of management and outcome. The lower quality of care in older stroke patients may contribute in part to the poorer outcome in the elderly. Improving stroke outcome in this older age group will constitute a challenge for all physicians. It appears vital that older patients, as well as younger subjects, benefit from practice guidelines and standardized management in the neurological ward.

Acknowledgment

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References


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