Outcome and Risk Factors Presented in Old Patients Above 80 Years of Age Versus Younger Patients After Ischemic Stroke

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Background: Older patients are associated with increased stroke prevalence, worse outcome, and risk of undertreatment in comparison with younger patients. The aim of the present study was to compare risk factor distribution and functional outcome in stroke survivors older and younger than 80 years. *Methods:* The analysis was based on consecutive patients admitted within 6 hours after stroke onset and discharged with ischemic stroke, surviving at least 3 months after ictus. To prevent bias, the analysis was based on a registry from before implementation of tissue plasminogen activator treatment; all patients received stroke unit care in accordance with the guidelines. The population was dichotomized into patients aged less than 80 years and 80 years of age or older. Modified Rankin Scale (mRS) score and Barthel Index (BI) were used to assess 3-month and 1-year outcome. *Results:* Patients 80 years of age or older presented with significantly more severe strokes than younger patients, median Scandinavian Stroke Scale score 39 vs 42 ($P = .003$). Median mRS score before stroke was significantly higher in patients aged 80 years or older ($P < .001$) and remained high 3 months and 1 year after ictus ($P < .001$); the BI was equivalently lower ($P < .001$). The decline in function was comparable between groups. Patients 80 years of age or older of whom the majority were women ($P < .001$) presented with atrial fibrillation ($P < .001$), and hypertension ($P = .005$). *Conclusions:* Risk factors vary significantly with age, suggesting different stroke mechanisms. Patients older than 80 years experience more severe strokes and frequently have minor impairments before stroke. The increase in impairment after stroke is comparable with what is observed in younger patients, suggesting that good recovery after stroke may also be expected in older patients. **Key Words:** Ischemic stroke—recovery—old patients—functional ability.
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Increasing average life expectancy and subsequent increase in the elderly population have resulted in higher stroke prevalence, because of the well-established association between old age and cardiovascular events.[1-3] Mortality and disability after stroke are known to be more frequent in the older patients compared with younger patients[4-6] although the effect of stroke unit treatment is well established, independent of age.[7] It has been reported that older patients with stroke are less likely to receive prevention regarding risk factors before stroke,[8] are excluded in clinical research trials,[9] and are less likely to receive acute stroke therapy.[10,11] Therefore, the knowledge regarding differences in risk factor distribution and the potential for functional improvement in older stroke survivors remains sparse.

Until recently fibrinolysis has only been considered a treatment option for patients younger than 80 years of age and endovascular treatment is generally reserved

for even younger patients,[12-15] and only recently has the third International Stroke Trial study documented benefit in patients aged 80 years or older.[16] This means that registries created after general implementation of treatment with thrombolysis are likely to be biased when comparing older and younger patients due to the treatment effect of fibrinolysis. We therefore set out to use an existing pre-fibrinolysis registry where guideline-based stroke unit care had been applied to all age groups.

The aim of the present study was to compare risk factor distribution and functional outcome 3 months and 1 year after stroke onset, in survivors of acute ischemic stroke patients younger and older than 80 years.

Materials and Methods

Data from this registry has been previously published.[17] This is a retrospectively planned analysis, based on a prospectively created registry including consecutive patients discharged with a diagnosis of ischemic stroke from the acute stroke unit at Copenhagen University Hospital, Bispebjerg. The study period was from February 1, 1998 to October 2001.

The acute stroke unit received all patients presenting with symptoms of acute stroke within 6 hours of stroke onset from the Copenhagen area. Patients underwent computed tomography (CT) scans within 24 hours and were monitored in a specialized acute stroke care unit and subsequently rehabilitated in a state-of-the-art multidisciplinary stroke unit as previously described.[17]

The population was dichotomized based on age into patients younger than 80 years and 80 years of age or older. Inclusion into the analysis was based on patients with ischemic stroke diagnosed by clinical findings and CT scan, who survived at least 3 months after ictus (Fig 1).

Outcome, demographic variables, and recognized risk factors were available from the registry. A specialized nurse conducted the follow-up after 90 days, mainly by telephone. Outcome as to survival was known in all patients. Outcome as to functional outcome was missing in 77 patients, 10.4% for patients younger than 80 years and 9.6% for patients 80 years of age or older.

On admission, stroke severity was assessed with the Scandinavian Stroke Scale (SSS).[18,19] The functional status was described using the modified Rankin Scale (mRS)[20] score on admission, at 3 months, and 1 year after ictus. The Barthel Index (BI) assessed activities of daily living 3 months after ictus.[21] Outcome was based on the mRS score and BI results.

On admission and during the inpatient time, recognized stroke risk factors were documented.

Statistical analysis was performed using the statistics program SPSS, version 19.0 (IBM, Chicago, IL). The nonparametric variables SSS, mRS score, and BI were statistically calculated using the Mann–Whitney test. The Pearson chi-square test was used to calculate the dichotomous variables, such as the risk factors.

The registry was approved by the Danish Data Protection Agency, latest file number 2013-41-1797.

Results

Of 1437 patients admitted with stroke during the study period, 759 were admitted within the first 6 hours and discharged with a diagnosis of ischemic stroke based on clinical findings and CT scans. The remaining patients were admitted later and/or discharged with a diagnosis of transient ischemic attack or intracerebral hemorrhage.

In patients with ischemic stroke, the mean age was 74 years; 479 patients (63.1%) were aged less than 80 years and 280 patients (36.9%) were aged 80 years or older. Mean age was 67 years (standard deviation, 10.4) in the group with patients aged less than 80 years, whereas the mean age was 85 years (standard deviation 3.6) in the group with patients aged 80 years or older.

Three months after stroke ictus, 417 patients (87.1%) aged less than 80 years and 202 patients (72.1%) aged 80 years or older were still alive (Fig 1). Patients aged 80 years or older experienced significantly more severe stroke than the younger patients, median SSS 39 versus 42 ($P = .003$).

The mortality was higher in the older patients (27.9% versus 12.9%). The median mRS score before stroke was higher in patients aged 80 years or older with an mRS score of 1 versus 0, ($P < .001$); the mRS score 3 months and 1 year after ictus remained 1 point higher in the older group ($P < .001$). The BI was similar, significantly lower in patients aged 80 years or older ($P < .001$) (Table 1). The increase in handicap as recorded by the mRS score was equal in the 2 groups from prestroke to 3 months after stroke ($P = .731$) and this was still the case 1 year after stroke onset in survivors ($P = .427$).

Patients 80 years of age or older of whom the majority were women ($P < .001$) presented with atrial fibrillation ($P < .001$), and hypertension ($P = .005$), whereas younger ischemic stroke patients were more frequently associated with diabetes ($P = .008$), hypercholesterolemia ($P = .013$), smoking ($P < .001$), and alcohol consumption ($P < .001$) (Table 2).

No differences were observed in the frequency of prior cardio- or cerebrovascular disease.

Discussion

In the present study, patients aged 80 years or older presented with slight impairment before stroke and more severe stroke symptoms on admission; however, the increase in handicap was comparable across age groups during the long-term follow-up. The mRS score before the stroke reflected that the younger patients had no