Original Study

Prestroke Mobility and Dementia as Predictors of Stroke Outcomes in Patients Over 65 Years of Age: A Cohort Study From The Swedish Dementia and Stroke Registries

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ABSTRACT

Objectives: To explore the association between prestroke mobility dependency and dementia on functioning and mortality outcomes after stroke in patients>65 years of age.

Design: Longitudinal cohort study based on SveDem, the Swedish Dementia Registry and Riksstroke, the Swedish Stroke Registry.

Participants: A total of 1689 patients with dementia >65 years of age registered in SveDem and suffering a first stroke between 2007 and 2014 were matched with 7973 controls without dementia with stroke.

Measurements: Odds ratios (ORs) and 95% confidence intervals (CIs) for intrahospital mortality, and functioning and mortality outcomes at 3 months were calculated. Functioning included level of residential assistance (living at home without help, at home with help, or nursing home) and mobility dependency (independent, needing help to move outdoors, or needing help indoors and outdoors).

Results: Prestroke dependency in activities of daily living and mobility were worse in patients with dementia than controls without dementia. In unadjusted analyses, patients with dementia were more often discharged to nursing homes (51% vs 20%; *P* < .001). Mortality at 3 months was higher in patients with dementia (31% vs 23% *P* < .001) and fewer were living at home without help (21% vs 55%; *P* < .001). In adjusted analyses, prestroke dementia was associated with higher risk of 3-month mortality (OR 1.34; 95% CI 1.18–1.52), requiring a higher level of residential assistance (OR 4.07; 3.49–.75) and suffering from more dependency in relation to mobility (OR 2.57; 2.20–3.02). Patients with dementia who were independent for mobility prestroke were more likely to be discharged to a nursing home compared with patients without dementia with the same prestroke mobility (37% vs 16%; *P* < .001), but there were no

differences in discharge to geriatric rehabilitation (19% for both; P = .976). Patients, who moved independently before stroke, were more often discharged home (60% vs 28%) and had lower mortality. In adjusted analyses, prestroke mobility limitations were associated with higher odds for poorer mobility, needing more residential assistance, and death.

Conclusions: Patients with mobility impairments and/or dementia present a high burden of disability after a stroke. There is a need for research on stroke interventions among these populations.

Stroke is a common cause of morbidity and mortality in patients with dementia.[1–3] Prestroke dementia is associated with worse outcomes,[4–7] including lower likelihood of home discharge, and a higher rate of disability[4] and mortality.[5–7] Physical frailty and impaired cognition both lead to negative outcomes,[8–10] although it can be hard to distinguish the causal order between many interacting factors in the pathway leading to disability and dependency.

Impaired mobility is one of the main determinants of frailty and predicts changes in frailty status, disability, and death.[11] Baseline mobility is an important predictor of functioning and mortality after stroke.[12–14] With an increasingly aging population, clinicians often face the challenge of managing stroke in patients who are frail, have mobility limitations, or have dementia. In such patients, prognosis is an important consideration.[3] This study is part of a larger project using a cohort obtained from the Swedish Dementia and Stroke registries to examine all aspects of stroke care in relationship with dementia status.[15] The aim of this specific study is to assess the role of mobility and dementia as predictors of level of residential assistance, dependency for mobility, and mortality in older patients with stroke.

Methods

The Swedish Dementia and Stroke Quality Registries and Patient Selection

The personal identity number enabled the linkage of data from the Swedish Dementia Registry (SveDem)[16] and the Swedish Stroke Register (Riksstroke).[15,17] In addition, variables were added from other registries: dispensed drugs from the Swedish Prescribed Drug Register,[18] mortality from the Population Registry,[19] and comorbidities [as *International Classification of Diseases, Tenth Revision* (ICD-10) codes] from the year 1998 onward from the National Patient Register, which contains all in-hospital and specialist diagnoses.[20]

SveDem is a national quality register,[16] recording incident dementia diagnosis made according to the ICD-10.[21] Information about demographics, social aspects, medication, and cognition measured by the Mini-Mental State Examination (MMSE)[22] at the time of dementia diagnosis are included.[9] Riksstroke has a coverage for acute stroke events >90%.[23] Ischemic and hemorrhagic strokes were included (ICD-10 codes I61, I63, and I64). The baseline registration includes demographics, social situation, some activities of daily living (help with clothing, toilet visits), and mobility dependency, together with detailed information on chain-of-care, treatments, and complications. Follow-up information at 3 months is collected through forms sent to the patient's home, filled by patients or their main caregivers, and includes information on mobility, other aspects of dependency and required level of residential assistance (living at home without help, at home with help or in a nursing home).

From 2007 to 2014, 58,154 patients were registered in SveDem. Of these, 2233 patients with dementia had suffered a stroke and been registered in Riksstroke. These were matched by age, sex, year of stroke, and geographical region with 8963 control patients without dementia from Riksstroke. Controls were excluded if they had ever had a registered diagnosis of dementia or delirium (ICD-10 codes

F00−F09, G30−G32) or used antidementia medications (Anatomical Therapeutic Chemical Classification System codes N06DX and N06DA). Patients ≤65 years of age were excluded. Because ascertainment and differentiation of quickly repeating strokes could be difficult in a population with dementia, patients who had stroke in the previous 7 years were excluded. This resulted in 1689 patients with dementia patients and 7973 patients without dementia stroke controls available for analyses.

Variables

Age at the time of diagnosis of dementia and stroke, was obtained from SveDem and Riksstroke, respectively. The number of drugs taken by the patient was obtained from the Prescribed Drug Register at 2 separate time points corresponding with the dementia and stroke diagnoses, and was used as a proxy for comorbidity.[9,24] SveDem also contributed dementia type and MMSE score at the time of dementia diagnosis. The time in days from dementia diagnosis to stroke diagnosis is shown. Functioning level prior to stroke was obtained from Riksstroke, including information on needing assistance with clothing, toilet visits, and mobility. Mobility was classified in 3 categories: independent, dependent on help outdoors, or dependent indoors and outdoors. The presence or absence of diabetes and atrial fibrillation were obtained from Riksstroke and from the National Patient Register (ICD-10 codes I48 and E10-E13, respectively), and the disease was considered present if it was registered in any of these 2 sources. Previous hip fracture (S72) was considered as a possible covariate because it could be related to mobility. Level of residential assistance (living at home with no help, at home with help, nursing home) at the time of stroke was obtained from Riksstroke. Consciousness at arrival to the emergency department was assessed by the Reaction Level Scale (RLS), a tool to record severity of brain injury. The RLS is coded in Riksstroke as RLS 1: fully responsive; 2−3: drowsy but still responds to stimuli; and 4−8: unconscious.[25]

Outcomes were obtained from Riksstroke. Short-term outcomes included (1) in-hospital deaths and (2) accommodation at discharge, which was classified as: home, nursing home, geriatric in-patient rehabilitation, and other (including those still hospitalized and other living situations). Outcomes at 3 months included (1) required level of residential assistance (at home without help, at home with help, nursing home), (2) mobility dependency, and (3) death. This 3-month follow-up was available for 89% of patients.

Statistics Analyses

Continuous, not normally distributed variables (age, number of drugs, MMSE score, and time from dementia diagnosis to stroke) were described with medians and interquartile range, using Mann Whitney U tests to obtain P values. For categorical variables, percentages are shown, and Pearson χ^2 or Fishers exact test with P values were calculated.

Binary logistic regressions were performed for the outcomes for mortality, and ordinal logistic regression for level of residential assistance and for mobility at 3 months. For ordinal logistic