Urinary Incontinence and Indwelling Urinary Catheters as Predictors of Death after New-Onset Stroke: A Report of the South London Stroke Register

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Objective: To explore the relationship between indwelling urinary catheters (IUCs), urinary incontinence (UI), and death in the poststroke period and to determine when, after the neurological event, UI has the best ability to predict 1-year mortality. *Methods:* In a prospective observational study, 4477 patients were followed up for 1 year after a first-ever stroke. The impact of UI or urinary catheters on time to death was adjusted in a Cox model for age, sex, Glasgow Coma Scale, prestroke and poststroke Barthel Index, swallow test, motor deficit, diabetes, and year of inclusion. The predictive values of UI assessed at the maximal deficit or 7 days after a stroke were compared using receiver-operating curves. *Results:* UI at the maximal neurological deficit and urinary catheters within the first week after the stroke were present in 43.9% and 31.2% patients, respectively. They were both associated with 1-year mortality in unadjusted and adjusted analysis (hazard ratio [HR], 1.78, 95% confidence interval [CI], 1.46-2.19, and HR, 1.84, 95% CI 1.54-2.19). Patients with UI and urinary catheters had twice the mortality rate of incontinent patients without urinary catheters (HR, 10.24; 95% CI, 8.72-12.03 versus HR, 4.70; 95% CI, 3.88-5.70; $P < .001$). UI assessed after 1 week performed better at predicting 1-year mortality than UI assessed at the maximal neurological deficit. *Conclusion:* IUCs in the poststroke period is associated with death, especially among incontinent patients. UI assessed at 1 week after the neurological event has the best predictive ability. **Key Words:** Indwelling urinary catheters—mortality—stroke—urinary incontinence.

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Introduction

Urinary incontinence (UI) is frequent after stroke. Functional status, hemorrhagic stroke, aphasia, motor deficit, mental impairment, and poststroke depression have all been associated with the risk of developing UI.[1,2] Its prevalence ranges between 33% and 79% in the days following acute stroke with almost half of those patients remaining incontinent 1 year after the stroke.[1,3] UI has been reported to be an independent predictor of institutionalization, severe disability, and death in the poststroke period.[1,4-6]

Indwelling urinary catheters (IUCs) are often used after the occurrence of an acute stroke (in almost 25% of patients) but are only seldom reported in studies.[7] IUCs are responsible for most of the urinary tract infections among hospitalized patients, with a risk of approximately 5% per day.[8] The acquisition of a catheter-associated urinary tract infection prolongs hospital length of stay, increases cost burden, and is associated with poorer functional outcomes and mortality.[9-11]

Thus the association between UI and death after a new-onset stroke might be confounded by the inclusion of IUCs. We explore if UI and the IUC are independent predictors of mortality and if the insertion of an IUC among patients presenting UI after a new-onset stroke has an impact on their risk of mortality. We also determined the best time to assess UI in regard to its predictive value for 1-year mortality.

Methods

For the purpose of this study we used data collected by the South London Stroke Register (SLSR). This register prospectively includes all first-ever stroke patients of all ages in an inner-city area of South London, covering the north of the boroughs of Lambeth and Southwark. In 2001, the population of the register area was 271,817. Hospital surveillance of admissions for stroke included 5 teaching hospitals. Community surveillance of stroke included patients under the care of all general practitioners within and on the borders of the study area.[12]

Data are collected in the acute stroke phase by trained fieldworkers, and follow-up is carried out using postal questionnaire or in face-to-face interviews at 3 months, 1 year, and then annually thereafter.

Patients or their relatives gave written informed consent. The study was approved by the ethics committees of Guy's and St. Thomas' Hospital NHS Foundation Trust, King's College Hospital Foundation, the National Hospital for Neurology and Neurosurgery, the Queen's Square Hospital, St. George's Hospital, and the Chelsea and Westminster Hospital. The detailed methods of patient notification and data collection have been previously described.[13]

Patients and Measurements

We included all participants recorded in the register between January 1, 1995, and December 31, 2011. Stroke diagnosis was made according to the World Health Organization definition of stroke and was verified by a study clinician.[14] Stroke subtypes were classified using computed tomography or magnetic resonance imaging, or at postmortem examination. Impairments at the time of the maximal neurological deficit were initially recorded either on physical examination or from medical record notes.

UI and Urinary Catheters

Continence status was specifically assessed in the SLSR's initial questionnaire at the time of maximum neurological impairment. UI was defined as any involuntary leakage of urine. Continence status prior to stroke, at 1 week, at 3 months, and at 1 year after the neurological event was extracted from the continence items of the Barthel Index (BI).[15]

Any IUC inserted during the first week following the stroke was recorded. No information on the indication to place the catheters or the duration of the catheterization was available. The information on IUC was not recorded on the data collection forms used in 1999 and 2000.

Disability and Covariates

The BI was used in order to assess patients' activities of daily living before and after the stroke. The level of consciousness was determined using the Glasgow Coma Scale (GCS), and patients who died immediately after the stroke were given a GCS score of 3. Swallowing capacity was determined using a water-swallowing test, and patients who could not undergo this test were classified as having failed. Dysphasia, dysarthria, visual field deficits, and limb weakness were clinically assessed. Stroke risk factors such as prior ischemic heart disease, current tobacco use, hypertension, and diabetes were also registered.

Follow-Up and Death Assessment

All patients were followed for at least 1 year. Survival time was calculated as the time between the date of stroke onset and the date of death, and participants who had not died were censored at 1 year after stroke.

Statistical Analysis

Patients were divided in 4 groups depending on the presence or absence of 2 variables: UI at the maximal neurological deficit and IUC. The main outcome was the difference in mortality among those categories. We calculated that 4477 participants (45% with UI) followed during 1 year with a 12% expected rate of event in the