Stroke and Incontinence

K.R. Brittain, MA; S.M. Peet, PhD; C.M. Castleden, MD, FRCP

Background—Urinary incontinence in the acute stage of stroke is seen as a predictor of death, severe disability, and an important factor on hospital discharge destination. Therefore, it is an important measure of stroke severity that not only affects the lives of stroke survivors but also those of caregivers.

Summary of Review—A number of studies have linked the presence of bladder dysfunction in stroke survivors to various neurological lesions in areas thought to be primarily involved in micturition. However, neurological deficits may affect management of bladder control secondarily by apraxia or aphasia, for example, and a significant number of strokes occur in individuals already experiencing incontinence.

Conclusions—Despite incontinence being such an important prognostic feature, there are many gaps in our knowledge of the relationship of stroke and incontinence, particularly fecal incontinence. There are almost no studies on the influence of achieving continence on outcome or how this might be brought about. This article reviews the literature on this important topic and highlights deficiencies in our knowledge and areas of future research. (Stroke. 1998;29:524-528.)

Key Words: urinary incontinence • fecal incontinence • stroke outcome • neurology

There is a high prevalence of urinary incontinence in stroke survivors that is associated with the size of the infarct or cerebral hemorrhage and to the mortality, morbidity, and discharge destination of the survivor. Such urinary incontinence causes considerable distress to stroke survivors and caregivers alike, worsening morale and influencing the ability to achieve optimum recovery.

Despite the importance of the association of urinary incontinence with stroke, until recently there were relatively few reports on possible neurological sites affected in such stroke survivors, on bladder characteristics, or on the effect of nonneurological disabilities and cognitive impairment on the prevalence of incontinence. Moreover, the effect of treating urinary incontinence in stroke survivors has been almost entirely ignored apart from a few reports in Japanese journals.1-3 The treatment of fecal incontinence in stroke survivors has hardly warranted a mention, despite the fact that its presence can predict outcomes and cause decreased morale in caregivers and sufferers.

The purpose of this article is to review current knowledge of the association between urinary and fecal incontinence and stroke. In view of the dearth of information on fecal incontinence in stroke survivors, the article will necessarily concentrate mostly on urinary incontinence. Other urinary tract symptoms are experienced by stroke survivors, but most authors do not comment on such symptoms and concentrate on incontinence. Studies that examine predictors of stroke severity focus on urinary incontinence entirely, whereas only those investigating stroke survivors with urodynamics also comment on obstructive symptoms.4-6 This review therefore focuses mainly on urinary incontinence as a symptom but recognizes the importance of other socially disabling lower urinary tract symptoms.

Prevalence of Stroke

A typical health authority of 250 000 persons can expect 500 new stroke cases and 1000 recurrent stroke cases each year, and at any one time there will be approximately 1500 survivors of stroke living in the community, of whom around 750 will have a significant level of disability.7 Indeed, stroke is the major cause of severe chronic disability in the UK, accounting for 4% of the total National Health Service budget,8-9 with stroke patients occupying approximately 12% of beds on general medical wards and 12% of stroke survivors becoming institutionalized within 1 year.7 Wolfe and colleagues10 reported that of 386 UK first-time stroke patients, 78% were treated in the hospital, particularly those who were younger and those who were incontinent. This shows that a large percentage of persons suffering from stroke are admitted to the hospital.

Prevalence of Incontinence

Daily incontinence, not only caused by a stroke, is common, affecting 1 in 20 persons aged under 65 years, increasing to 1 in 12 in those over 75 years of age.11 An average-size general practice of 2200 patients would include approximately 25 persons under the age of 75 years and 15 persons 75 or over with significant urinary incontinence, in addition to those in long-term care.11 The prevalence of urinary incontinence

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Prevalence of Urinary Incontinence After Stroke

<table>
<thead>
<tr>
<th>Authors</th>
<th>Publication Date</th>
<th>Sample Size</th>
<th>Age Group, y</th>
<th>Source of Sample</th>
<th>Time</th>
<th>Admission</th>
<th>Discharge</th>
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<td>1994</td>
<td>293</td>
<td>Not stated</td>
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<td>AA</td>
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<td>*</td>
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<td>165</td>
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<td>HA, UK</td>
<td>Dch</td>
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<td>25%</td>
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<td>1985</td>
<td>135</td>
<td>25% &lt;65</td>
<td>GP, HA, UK</td>
<td>2 wk and 6 mo</td>
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<td>*</td>
<td>12%</td>
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<td>Not stated</td>
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<td>AA and Dch</td>
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<td>26%</td>
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<td>AA and 6 mo</td>
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</table>

HA indicates hospital admission; AA, acute assessment (between 0 and 7 d); Dch, discharge.
*Not reported.

Prevalence of Urinary and Fecal Incontinence in Stroke Survivors

Recent studies conducted throughout the world have demonstrated an association between stroke and incontinence. A population census in the United States reported that 36% of persons aged 65 years and over had moderate difficulty in holding their urine some or all of the time and that this difficulty was associated with stroke. In the 65- to 74-year age group, the odds ratio for having had a stroke in women who had experienced severe difficulty holding urine was found to be 7.4. The majority of studies have, however, reported the prevalence of incontinence in stroke survivors, and these give a clear consensus of a high prevalence. Brocklehurst et al found that 51% of 135 consecutive stroke survivors were incontinent of urine and 23% were incontinent of feces at some stage during their first year after a stroke. More recently, Kamouchi et al reported that 69% of 106 elderly Japanese survivors of chronic stroke who were admitted to the hospital had urinary incontinence. The rate was significantly higher in those aged 75 years and over and in those with poor functioning in activities of daily living or with dementia. A further Italian study of 293 stroke survivors in 17 hospitals reported that 32% were incontinent 5 days after a stroke and 53% were catheterized. Overall, the prevalence of urinary incontinence in hospitalized patients from nine studies published between 1985 and 1997 suggests that between 32% to 79% of stroke patients at admission experience incontinence; at discharge, 25% to 28% experience incontinence, and between 12% to 19% will still experience incontinence some months after the stroke (see the Table). Similarly, the prevalence of fecal incontinence in hospitalized patients from two studies published in 1987 and 1997 would suggest that between 31% to 40% will experience fecal incontinence on admission, 18% will experience this at discharge, and between 7% to 9% will still experience fecal incontinence 6 months after the stroke.

Onset of Incontinence in Stroke Survivors

The main complication in comparing different studies that look at the prevalence of incontinence in stroke survivors is the definition of any incontinence. The apparent association between stroke and incontinence of urine is further complicated by premorbid and late-onset urinary incontinence, which few studies define. Late-onset urinary incontinence may be associated with the natural progression of conditions associated with urinary incontinence per se or with further strokes. Brocklehurst et al found in their study that 6 additional survivors at a 3-year follow-up became incontinent of urine, 4 of whom subsequently died. Only 17 of 12 reports that specifically sought a link between stroke or brain injury and incontinence investigated the prevalence of premorbid incontinence. This article suggests that 17% of 151 stroke survivors may have had incontinence before their stroke. The presence of premorbid incontinence is clearly important because it affects the apparent prevalence of incontinence due to stroke and because survivors who have premorbid incontinence may be very different from those who become incontinent after the stroke, with different morbidity and mortality. The rela-
tionship between stroke and incontinence may not only be in one direction.

Incontinence as a single symptom may be too exclusive, and lower urinary and fecal tract symptoms could deliver a better indication of urinary symptoms in stroke survivors. For example, a stroke survivor with bladder instability may not complain of urinary incontinence but of frequency and nocturia.

Neurological Lesions and Urinary Incontinence

The involvement of the frontal lobe in bladder control is frequently cited in the literature.\textsuperscript{5,6,39,40} In 1964 Andrews and Nathan\textsuperscript{43} pointed out that a region in the frontal lobe was important in the higher control of micturition and defecation. Their lengthy investigation in selected cases that included cerebral tumors, intracranial aneurysms, brain injury, and leukotomies suggested that frontal lobe damage was liable to cause urinary dysfunction. Gelber et al\textsuperscript{38} included 51 patients with unilateral ischemic hemispheric stroke and excluded patients with bilateral brain damage, brain stem stroke, and any previous urological surgery and patients with a history of previous stroke. They found an association between patients with poststroke urinary incontinence and those with large infarcts, aphasia, cognitive impairment, and functional disability. Burney et al\textsuperscript{44} linked the frontal and temporal lobes and internal capsule to urinary incontinence after stroke, but they failed to identify which of the patients presented with urinary symptoms. Further studies have identified the frontal cortex or the frontoparietal lobes as being associated with urinary dysfunction after stroke,\textsuperscript{6,39–41} and only one study failed to find any such association.\textsuperscript{52}

However, a recent study confirms that the size of the stroke is more important, whereas the side of the stroke is not.\textsuperscript{56} Only the occipital lobe seems to be free of any connection with urinary incontinence.

Bladder Characteristics in Stroke Survivors With Incontinence

Urinary incontinence in stroke survivors may not be due to the stroke lesion per se but may have been there premorbidly from nonurological causes (see below). It is the authors’ experience that the prevalence of prestroke incontinence and other lower urinary tract symptoms are high in this population. If an accurate history cannot be obtained and if nonurological causes (see below) have been excluded, further investigations of the urological symptoms are indicated. Abdominal ultrasound importantly excludes retention, but it can also assess whether bladder stones or other urinary tract pathology, such as carcinoma, is present. Urodynamic examination may reveal an overactive or underactive detrusor muscle and help to decide whether outflow obstruction is present, but a cooperative patient is necessary for the latter and investigators should be aware of the presence of detrusor instability in continent, healthy persons.\textsuperscript{44,45} Any results from urodynamic examinations therefore need to be interpreted in the light of the survivor’s symptoms and holistic condition.

There is no uniformity in the type of bladder lesion diagnosed on urodynamic studies in stroke survivors. Studies have revealed that incontinence in stroke survivors may be due to diagnoses similar to those found in incontinent persons without stroke. There appears to be a majority of survivors with detrusor dysfunction (hyperreflexia or hyporeflexia).\textsuperscript{6,38,39} Outflow obstruction is common but detrusor sphincter dysynergia is not.\textsuperscript{6,38} Hyperreflexia, if new, is probably due to the stroke lesion itself. Normal storage and emptying of urine is dependent on a number of reflexes of increasing complexity as the spinal cord is ascended.\textsuperscript{46} Damage to the brain can induce bladder overactivity by reducing suprapontine inhibition. Detrusor sphincter dyssynergia arises from spinal lesions and therefore is uncommon in stroke survivors, and if present it is unlikely to be due to an intracerebral lesion.

Nonurogenital Causes of Incontinence

There are other nonphysiological barriers to maintaining continence, such as communication and mobility.\textsuperscript{47} To remain continent a person must be able to appreciate the need to void, communicate their need to a caregiver, be motivated, be able to bear weight or assist in transferring to a toilet or commode or use an appropriate appliance, to delay voiding until the appropriate time, and to initiate voluntary voiding.\textsuperscript{37} Dysphagia,\textsuperscript{37} aphasia,\textsuperscript{6} and impaired cognitive and functional ability are all correlated with urinary incontinence, but so too are nonurological complications of stroke such as fecal impaction, drug therapy, or increased solute load. Any drug with adrenoreceptor blocking action will worsen the urethral sphincter weakness, whereas anticholinergic drugs may precipitate retention. Diuretics may lead to detrusor contraction by causing rapid bladder filling, and stroke itself may worsen diabetic control, increasing glycosuria. Finally, urinary tract infection and low estrogen levels in postmenopausal women contribute to poor bladder and sphincter control.\textsuperscript{48}

Progress of the Stroke Survivor With Incontinence

Incontinence is a marker for stroke severity because of its association with death and disability and its influence on the place of discharge of stroke survivors.\textsuperscript{30,33,49} Those who remain continent in the first few days after stroke experience lower mortality. Of patients who experience urinary incontinence, 52% are dead within 6 months compared with 7% of patients who remain continent.\textsuperscript{33} Similarly, for fecal incontinence the risk of death is greater. Of stroke patients who experience fecal incontinence, 59% are dead within 6 months compared with 7% of patients who initially had no fecal incontinence.\textsuperscript{33} Anderson et al\textsuperscript{50} reported that the relative risk of death within 1 year in their 321 acute stroke patients was 3.9 if they had had incontinence (95% confidence interval, 1.4 to 10.6). The definition of urinary incontinence used in this study was broad and included patients who had accidents or those who needed general help or needed an indwelling catheter during admission to the hospital. None of these studies made a distinction between urinary incontinence that began before or after onset of stroke, and some recruited their sample from hospital admissions, perhaps biasing their sample toward those more severely affected.\textsuperscript{33}

A number of studies have shown that urinary incontinence is not only an active predictor of survival but also of recovery. For example, initial incontinence in first-time stroke survivors younger than 75 years was the best single predictor of severe or...
moderate disability at 3 months, with a sensitivity of 60% and specificity of 78%. This study gathered information on mobility status before the stroke, which was taken into account during analysis. A Danish study reported a significant relationship between the presence of urinary incontinence and length of hospital stay, circumstances of discharge, and mobility. Barer found that stroke outcome was much better in those who remained or became continent than in those who had incontinence, which could suggest that recovery of continence may correlate with better outcomes. However, despite the evidence for urinary incontinence as a predictor of stroke severity, treatment options are limited.

The relationship between urinary incontinence and stroke severity is complex. Urinary incontinence may be a predictor of stroke severity, and the presence of incontinence is associated with a greater risk of death and disability. However, the specific causes and mechanisms underlying this relationship are not well understood. The impact of urinary incontinence on the quality of life for stroke survivors and their caregivers is a significant concern. The treatment of urinary incontinence in stroke survivors is challenging, and there is a need for further research to develop effective interventions.

References

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