Management of bladder dysfunction in patients with multiple sclerosis


Abstract

Multiple sclerosis is a chronic disease of the central nervous system that often has a disabling effect, resulting in reduced quality of life for patients. Bladder dysfunction is a common and distressing symptom. Nurses can have a key role in the management of this symptom by promoting an integrated approach to care, thereby improving bladder control and reducing patient anxiety. This article explores the core elements of a specialist continence assessment in this patient group, and provides a critical overview of treatments used for managing bladder problems.

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Keywords
Bladder dysfunction, continence, multiple sclerosis, patient assessment

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MS is characterised by progressive autoimmune destruction of the myelin sheath that insulates the nerve axons in the central nervous system. This process is called demyelination and leads to the formation of hardened plaques (scleroses). The insulation provided by the myelin sheath increases the speed at which nerve impulses are transmitted, and prevents these signals from being interrupted. In patients with MS, the scleroses disrupt the neural pathway, causing impairment of many voluntary functions, including movement of muscles and functions of the bladder and bowel. Scleroses can be present in multiple regions of the brain and spinal cord (Multiple Sclerosis Trust 2007). Common sites for lesions are in the optic nerve, resulting in pain and blurred vision; in the brainstem or cerebellum, causing vertigo and double vision; and in the spinal cord, resulting in limb weakness and impaired urinary control (Fowler et al 2009).

The cause of MS is not understood fully. There is some evidence to suggest a genetic predisposition in some people (Chaudhuri and Behan 2004), although MS is not defined as hereditary. There has been speculation that viral exposure may act as a precursor to MS in people who are genetically predisposed (Multiple Sclerosis Trust 2007).

Bladder control

In normal bladder control, the sympathetic nervous system regulates the process of urine storage, and the parasympathetic nervous system controls bladder contraction and the passage of urine. During urine storage, inhibition of the parasympathetic nerves of the detrusor muscle, which surrounds the urinary bladder, ensures that the pressure in the urethra is greater than that within the bladder so that urine does not flow out. At the initiation of micturition, the complex interplay between the relaxation of the muscles of the urethral sphincter and innervation of the parasympathetic nerves of the detrusor muscle result in passage of urine from the bladder to the
Diagrammatic representation of neural pathways controlling bladder function

Storage and voiding problems
The dynamic and unpredictable nature of disease progression results in many people with MS experiencing negative effects on their quality of life. Urinary incontinence results in frustration and loss of personal space and time, adversely affecting carers’ and patients’ relationships (Bayliss and Salter 2004).

Patients with MS can present with urinary symptoms characterised by difficulty in storage or voiding of urine. Effective bladder emptying is dependent on co-ordination of the urethral sphincter, detrusor contraction and sensory impulse initiating the urge to void. In normal bladder function, sensory impulse can be voluntarily suppressed to allow micturition to occur at a convenient time and place (Rigby 2003). Loss of voluntary bladder control and resulting urinary incontinence is the most common symptom seen in clinical practice (Haslam 2009). This is caused by hyperreflexia, or involuntary and irregular contraction of the detrusor muscle, manifesting in a strong sense of urgency to void irrespective of the volume of urine present in the bladder. If these contractions cause the bladder (intravesical) pressure to exceed that of the external urethral sphincter (intraurethral) pressure, then urge incontinence may occur (Shah and Leach 2001). The ability of patients with MS to respond to this urgency is further impeded by loss of mobility and environmental factors such as the availability of toilet facilities.

Detrusor underactivity, known as hyporeflexia or areflexia, can result in similar symptoms to overactive bladder – the frequent need to pass small amounts of urine and, in some cases, overflow incontinence. One explanation for this could be that a disruption in the spinal pathway at S2-S4 (Figure 1) causes failure of activation or inhibition of the pontine micturition centre in the pons, leading to incomplete bladder emptying (Pellatt 2008). Detrusor hyporeflexia can give rise to a sensation of incomplete bladder emptying, poor urine stream and post-micturition dribble (Rackley et al 2011). Detrusor sphincter dyssynergia (disturbance in muscular co-ordination) is also prevalent in this group of patients. This occurs when the detrusor contraction fails to synchronise with relaxation of the urethral sphincter, thereby obstructing the passage of urine. Detrusor sphincter dyssynergia is also associated with the distressing symptoms of hesitancy to initiate voiding, often with intermittency (Rackley et al 2011).

Initial assessment
Initial assessment is likely to be undertaken in a generic care setting by a healthcare professional without specific specialist training in bladder dysfunction. However, it must be emphasised that the assessment process for a patient with MS presenting with lower urinary tract symptoms should be no different to that which would be undertaken with anyone presenting with these symptoms. In many cases, the patient with MS lives an independent active life and may initially report bladder problems to the GP or practice nurse. The imperative in the clinical assessment process is to exclude or confirm the need for urgent referral to...
the urology department, or to identify the most appropriate care pathway through which the patient can be managed effectively.

Assessment of bladder dysfunction should start with an accurate and complete diary of daily bladder function. The assessment tool used should have space for recording fluid intake and voided output, including frequency and type of fluid consumed, together with any episodes of incontinence. Although MS is often a primary cause of bladder dysfunction, exacerbation of symptoms can be influenced by multiple factors such as type and amount of fluid consumed, restriction of fluid intake, constipation and medication. For example, Rigby (2003) exposed the common myth that restricting fluid intake will reduce the urge to void and alleviate episodes of incontinence. Paradoxically, prolonged restriction of necessary fluids results in bladder irritability and increased symptoms of urgency. Conversely, high fluid intake in the evening is correlated with increased symptoms of nocturia and nocturnal enuresis (Gilbert 2006).

**Assessment algorithms**

NICE (2010) provides evidence-based clinical pathways for the assessment and management of lower urinary tract symptoms. These clinical guidelines advocate a stepwise approach for generalist clinicians at initial assessment and clearly differentiate between conservative management options and the need to refer the patient for specialist assessment. The example algorithm illustrated in Figure 2 relates to the analysis and management of bladder symptoms (Holland and Reitman 2008). Although algorithms are used to direct the assessing clinician through a decision-making process, generalist clinicians should liaise with a continence specialist if they have any concerns or feel that patient management has become more complex.

**Specialist continence assessment**

Progression of MS may dictate the need for a more detailed urinary bladder assessment and investigation to exclude contributory factors such as neurogenic detrusor overactivity. The evaluation of conservatively implemented management plans can be used to inform a specialist bladder assessment by a continence adviser or urology specialist nurse. Ideally, a specialist bladder assessment will also be informed by the broader patient management plan overseen by an MS specialist nurse. The importance of specialist continence assessment cannot be overstated because correct identification of the prevailing symptom profile informs the management plan (Griffiths 2002). The accurate interpretation of investigations can only be achieved through structured advanced training and acquisition of advanced clinical skills (Fowler et al 2009).

In patients with MS, the identification of episodes of urinary frequency with urge incontinence can conceal the presence of a urinary tract infection. Routine reagent strip urinalysis for evidence of microscopic haematuria, nitrites and leucocytes should be undertaken in patients with new symptoms of bladder dysfunction (Fowler et al 2009). It is important to emphasise that the presence of microscopic haematuria in the absence of infection must trigger a referral to a urology department for assessment.

Fresh urine is normally sterile; therefore the presence of leucocytes, nitrites and protein is often indicative of a urinary tract infection. In this instance, a urine specimen should be obtained for microscopy, culture and sensitivity and, if appropriate, treatment should be commenced (NICE 2010). Rigby (2005) advised that caution is necessary when interpreting the results of reagent test strips because false positive results are common. Results can be influenced by medication, vitamin C consumption and the presence of glycosuria, and need to be interpreted in the context of individualised clinical assessment (Scottish Intercollegiate Guidelines Network 2006).

**Post-void residual volume of urine**

A more definitive indicator for bladder dysfunction is obtained by performing a post-void bladder ultrasound scan. This non-invasive investigation can determine if there is any remaining post-void residual volume (PVR) of urine present in the bladder (Rigby and Housami 2009). Abdel-Fattah and Barrington (2005) supported the use of portable bladder ultrasound scans to measure PVR in clinical practice, citing that their accuracy in obtaining PVR measurements is comparable with conventional urethral catheter insertion, and they also have the advantage of eliminating potential risks associated with the introduction of infection.

Many authors have suggested that a PVR that exceeds 100mL is regarded as a significant determinant of urinary bladder voiding dysfunction in patients with MS (Getliffe and Dolman 2003, Milleman et al 2004, Haslam 2009). However, based on experience from practice, the author would advise caution in using a bladder volume of 100mL to indicate intervention, because considerable volume variations exist in patients with chronic urine retention. Any intervention should be based on
the overall assessment of the patient. Preservation of renal function and alleviation of bothersome symptoms are essential goals of care.

Although patients with MS can experience high PVR as a result of hyporeflexia or detrusor sphincter dyssynergia, further investigation using uroflow studies will generally confirm a poor urine flow rate (Rigby 2005). However, as previously mentioned, an underlying urinary tract infection can also cause a high PVR and poor flow rate and must be excluded.

**Constipation**

There is a strong correlation between bladder dysfunction and constipation in people with MS (Correia de Sa et al 2011). Although this article is primarily concerned with bladder dysfunction, it is important to acknowledge that neurological damage to the central nervous system will also affect bowel function and so has a pivotal role in aggravating bladder symptoms. It has been reported that 70% of people with MS experience bowel problems including constipation, incomplete

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**FIGURE 2**

Analysis and management of bladder symptoms

- **Urinary symptoms**
  - Is urinary tract infection present?
    - Yes: Treatment → Are symptoms relieved?
    - No: Is patient retaining urine?
      - Yes (PVR>200mL): Intermittent catheterisation → Are symptoms relieved?
      - No (PVR<200mL): Anticholinergic medication education → Continue intermittent catheterisation with periodic PVR
  - No: Are symptoms relieved?
    - Yes: Continue intermittent catheterisation and anticholinergic medication with periodic PVR
    - No: Urological consultation

- **Anticholinergic medication education**
  - Are symptoms relieved?
    - Yes: Continue anticholinergic medication
    - No: Urological consultation

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PVR=post-void residual volume

(Reproduced with permission from Nancy Holland, National Multiple Sclerosis Society; Holland and Reitman 2008)
defecation and inability to defecate (Multiple Sclerosis Trust 2007, Correia de Sa et al 2011).

The complex interplay between systemic and behavioural elements illustrates the need to ensure that chronic constipation is not exacerbating PVR measurements. NICE (2003) emphasised the need for appropriate risk assessment for constipation. Moreover, the increased predisposition to bowel dysfunction in patients with MS gives further impetus to routine application of an assessment tool, such as the Rome III diagnostic criteria for functional constipation during initial assessment (Longstreth et al 2006).

Care is required when interpreting raised PVR because observation from practice shows that many patients with MS have commenced antimuscarinic medication before receiving a specialist continence assessment. It is clinically prudent to request a bladder ultrasound examination before this medication is prescribed for patients with MS, because pre-existing hyporeflexia will result in further exacerbation of urinary retention and episodes of overflow incontinence (Griffiths 2002, British Medical Association and Royal Pharmaceutical Society of Great Britain 2003).

Integrated care
Community nurses are pivotal providers of clinical care for patients with MS, especially for patients who are unable to walk and are confined to their home. Although bladder symptoms are highly prevalent in this patient group, outcomes can be improved through the promotion of a ‘whole person’ shared model of care. Clinical observation shows that the psychological needs of the patient with MS may be eclipsed or relegated by a multitude of treatment regimens. It is prudent to suggest that this element of care needs to be identified clearly and accommodated in all care planning. However, considering current financial constraints in the NHS, it is unlikely that the national shortage of specialist MS nurses will be addressed in the near future (Meikle 2011).

Decline in the number of nurse specialists, combined with the impact of an unpredictable debilitating neurological condition and bladder and bowel symptoms, provoke anxiety and distress (Multiple Sclerosis Trust 2007). Evidence-based guidance and treatment algorithms are available to assist nurses and the broader multidisciplinary team in the management of patients with MS (NICE 2003, Department of Health 2005, Multiple Sclerosis Trust 2007, Fowler et al 2009), and these should inform care planning processes in acute and community care settings.

Treatment modalities
Preservation of the upper urinary tract presents a significant challenge in patients with MS because there is a strong correlation between bladder dysfunction, increased incidence of recurrent urinary tract infection and hydronephrosis in this patient group (Griffiths 2002, Haslam 2009). Instigating an appropriate management regimen is dependent on both the knowledge of the practitioner and the agreement of the patient, as initial intervention rarely results in rapid resolution of symptoms (Koch and Kelly 1999, Wollin et al 2005).

Antimuscarinic drugs
Neurogenic detrusor overactivity represents the most widely reported chronic urinary symptom in patients with MS (Haslam 2009, Stöhrer et al 2011). Antimuscarinic drugs, formerly known as anticholinergics, can offer significant improvement in symptoms of urinary urgency, frequency and nocturia (Rigby 2011). When prescribing antimuscarinic medication for presenting symptoms of neurogenic urge incontinence in a person with MS, care must be taken to ensure that the prevailing symptoms are not a consequence of failure to empty the bladder or acontractile bladder resulting in overflow incontinence. Use of antimuscarinic medication in this circumstance will exacerbate urine retention further and may lead to hydronephrosis. It is also important to employ caution before prescribing antimuscarinic medication to patients susceptible to closed-angle glaucoma and this medication should be avoided in patients with myasthenia gravis. Antimuscarinic medications may exacerbate symptoms of blurred vision, drowsiness and other central nervous system effects known to occur in people with myasthenia gravis (Foon and Drake 2010). Commonly used preparations such as oxybutynin, tolterodine and solifenacin provide symptomatic relief of urinary incontinence for some patients with MS (Rigby 2011). However, their efficacy is inconsistent with reported side effects of dry mouth and blurred vision, which hinder concordance with treatment (Rigby 2011). Moreover, caution must be observed if constipation represents an element of an identified symptom profile, as this will be further exacerbated by this medication (Rigby 2011).

The mode of action of antimuscarinic medications is to block the neurotransmitter acetylcholine from influencing muscarinic
receptors in the bladder, resulting in a reduction in detrusor contractility (Shah and Leach 2001, Rigby 2011). Initial findings with newer antimuscarinic preparations, such as fesoterodine fumarate, have been positive in reducing bothersome urge incontinence episodes; however, side effects still occur with this medication (Herschorn et al 2010). The oxybutynin transdermal patch provides an alternative mode of drug absorption and is the only available transdermal patch for treating overactive bladder. This mode of administration has a reduced side effect profile and avoids first-pass hepatic and intestinal metabolism, thereby increasing the therapeutic levels of the drug (Rigby 2011).

Desmopressin – a synthetic analogue of the posterior pituitary hormone vasopressin (the naturally occurring antidiuretic hormone) – could be used selectively to control symptoms of nocturia and nocturnal enuresis in patients with MS (Bosma et al 2005). The authors suggested that multiple episodes of nocturia have been reduced to one episode during the night in some patients (Bosma et al 2005); however, caution is advised in this context because the benefits are inconsistent and gaining concordance with the long period of fluid abstinence necessary to prevent potential fluid overload is difficult.

Botulinum
A treatment option gaining popularity for the management of neurogenic detrusor overactivity is detrusor injections of botulinum neurotoxin type A (BoNT/A). Kalsi and Fowler (2005) showed how this may represent a treatment option for some MS patients experiencing debilitating neurogenic detrusor overactivity with urge incontinence. BoNT/A injections block the action of parasympathetic acetylcholine, essential for bladder contraction. However, Kalsi and Fowler (2005) emphasised that treatment with BoNT/A injections causes incomplete bladder emptying and patients should be assessed to determine whether they can incorporate a clean intermittent catheterisation (CIC) regimen into their lifestyle.

Penile sheaths
It may be prudent to consider using penile sheaths in male patients with a hyperreflexic bladder that exacerbates symptoms of nocturia and nocturnal enuresis. This option has been found to be particularly effective as an initial intervention in men who share a bed with a partner in order to alleviate the distress incontinence causes (Williams and Moran 2006). Pomfret (2003) suggested that the penile sheath is indicated for those men who experience urinary frequency and urgency and have difficulty accessing a toilet due to functional impairment. Experience from practice suggests that many male patients with advancing MS have difficulty using a portable urinal in bed due to ataxia and that the penile sheath may be an effective urine collection device. There is no comparative collection device for females with MS. However, for female patients who maintain some degree of manual dexterity but for whom mobilising to the toilet is a challenge, urine collection devices, such as the portable Female URIbag (Figure 3) and the Lady Funnel (Figure 4), may be useful.
Intermittent catheters and indwelling catheters

The best management regimen for failure of voluntary bladder emptying is CIC, with the addition of antimuscarinic medication if necessary for the hyperreflexic bladder (Rigby 2011). Failure of bladder emptying can lead to complications such as hydronephrosis, renal insufficiency and renal failure, which can exist in 15–20% of MS patients (Griffiths 2002). CIC will relieve the symptoms associated with an acontractile bladder or obstruction caused by detrusor sphincter dyssynergia (Rackley et al 2011). This form of bladder management has significant advantages over indwelling Foley catheters, with reduced risk of catheter-associated urinary tract infection, and is consistent with NICE (2003b) recommendations.

If catheterisation is undertaken independently or by a suitably trained partner or carer in the patient’s home, there is no requirement to maintain a sterile environment, although promoting good personal hygiene should form an integral part of any education and training plan. Modern Nelaton catheters used for CIC are made of PVC with a hydrophilic coating, and are designed for single use. Many have an integral water bag incorporated in the packaging; this provides an effective lubrication medium, so avoiding trauma to the urothelial lining of the lower urinary tract.

The frequency with which CIC should be undertaken is dependent on several factors. Logan (2011) suggested that it is advisable to limit the procedure to once or twice daily, initially, in order that the patient can adjust to the new regimen. It is important to keep a good record of the regimen followed, with the time of day the procedure is undertaken, the volume of urine drained before CIC, the volume of residual urine drained, and any episodes of incontinence noted between catheterisations. In the author’s experience the frequency of daily CIC varies between once and five times per day, based on clinical need and lifestyle factors.

Some patients with MS who experience significant ataxia or cognitive impairment may not be suitable for CIC. Personal beliefs and perceived indignity at having to rely on partners may exclude this management option. Furthermore, CIC may not be advisable for those patients where good levels of personal and environmental hygiene cannot be assured or where continuity and consistency of carer support is limited.

In these cases, long-term catheterisation may represent the most effective bladder management strategy. However, as Bissett (2005) reported, there are inherent complications with long-term catheterisation, such as recurrent symptomatic urinary tract infections, urethral trauma with spasm and pain, and the formation of calculi which can prevent the catheter from draining effectively.

Surgical catheterisation

The option of suprapubic catheterisation (percutaneous suprapubic cystotomy) may be appropriate in patients in whom MS has progressed to a point where CIC is not a viable option; for example, the patient may be immobile, and normal bladder emptying is compromised. This mode of management would require the patient to undergo a surgical procedure during which a trocar is passed through the lower abdomen above the symphysis pubis and an incision is made into the bladder wall. A long-term indwelling Foley catheter is inserted into the bladder to facilitate urine drainage. Suprapubic catheterisation may also be an appropriate management option for patients who are sexually active or are confined to a wheelchair (Haslam 2009). There are advantages to avoiding invasion of the lower urinary tract, including reduced risk of urethral infection or trauma, ease of management during catheter changes and improved patient comfort (Rigby 2005).

Experience from practice reveals that many patients who undergo this procedure initially report higher levels of satisfaction compared with urethral catheterisation. However, as Pomfret (2001) reiterated, many of the disadvantages noted with urethral catheters can also present with suprapubic catheters. A suprapubic catheter is an invasive device and therefore breaches the normally sterile bladder environment; bacterial colonisation increases the risk of symptomatic urinary tract and abdominal wall infection (Rigby 2009). Suprapubic catheterisation does not negate the potential for deposits to form on the catheter tip or the potential for catheter-related detrusor spasm and urethral leakage of urine. Decision making regarding catheter insertion should be informed and any lower urinary tract difficulties considered carefully. The procedure and any associated risks should be explained to the patient and supported by relevant information. The patient’s understanding should be checked before obtaining consent to undertake the procedure.

Conclusion

The assessment and management of bladder symptoms in patients with MS are complex and multifaceted. The disease process is often progressive and patients will need continuous reassessment and changes to care plans that address bladder symptoms effectively. It is
important to acknowledge that the specialist continence assessment should form one element of an integrated approach to the care of this patient group. Management of bladder dysfunction in patients with MS can only be effective if an integrated approach is adopted by all those involved in caring for this patient group. It is strongly advised that commissioners and service leads consider clinical resources for patients with MS as an integral part of their long-term conditions and hospital avoidance strategies.

**References**


