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Review Article

Clinical guidelines for the diagnosis and management of neurogenic lower urinary tract dysfunction

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ABSTRACT

This article reports the current evidence and expert opinions on the diagnosis and management of neurogenic lower urinary tract dysfunction (NLUTD) in Taiwan. The main problems of NLUTD are failure to store, failure to empty, and a combination of these two. Priorities in the management of NLUTD, in order of importance, should be the following: (1) preservation of renal function; (2) freedom from urinary tract infection; (3) efficient bladder emptying; (4) freedom from indwelling catheters; (5) patient agreement with the management modality; and (6) avoidance of medication after proper management. Management of the urinary tract in patients with spinal cord injuries or multiple sclerosis must be based on urodynamic findings rather than on inferences from the neurological evaluation. Identification of high-risk patients is important to prevent renal functional impairment in those with chronic NLUTD. The lower urinary tract function of patients with NLUTD should be regularly followed up by urodynamic study, and any urological complication should be treated adequately. Avoiding a chronic indwelling catheter can reduce the incidence of developing a low compliant bladder. Intravesical instillation of vanilloids and injecting botulinum toxin-A are alternative treatments for refractory detrusor overactivity or a low compliant bladder, and can replace the need for bladder augmentation. When surgical intervention is necessary, less invasive types of surgery and reversible procedures should be considered first, and any unnecessary surgery in the lower urinary tract should be avoided. Keeping the bladder and urethra in good condition without the interference of neuromuscular continuity provides patients with NLUTD the opportunity to use new technologies in the future. Improving the quality of life in patients with neurogenic voiding dysfunction is the most important aspect of treatment.

Conflicts of interest: none.

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1. Introduction

Neurogenic lower urinary tract dysfunction (NLUTD) includes dysfunction of the urinary bladder and urethra due to lesions of the central nervous system or peripheral neurogenic lesions. Cerebrovascular accidents (CVAs), intracranial lesions, Parkinson's disease (PD), cerebral palsy, multiple sclerosis (MS), transverse myelitis, and spinal cord lesions can result in NLUTD [1]. Spinal cord injury (SCI) and MS remain the most difficult to manage disorders causing NLUTD.

Frequency, urgency, and urinary incontinence are all commonly reported in patients with neurogenic detrusor overactivity (NDO). Approximately 10% of patients with stroke develop neurogenic disease [2]. Up to 75% of MS patients report some form of urinary incontinence [3]. One in 10 patients presents with bladder symptoms at the time of MS diagnosis [4]. The vast majority of SCI patients have bladder dysfunction [5].

NLUTD presents a great disease burden on patients, affecting not only their prognosis but also their quality of life (QoL), self-esteem, and relationship with their families. It is commonly associated with urinary incontinence, voiding problems, reduction in bladder compliance, and upper urinary tract damage [6].

Priorities in the management NLUTD, in order of importance, should be the following: (1) preservation of renal function; (2) freedom from urinary tract infection (UTI); (3) efficient bladder emptying; (4) freedom from indwelling catheters; (5) patient agreement with the management modality; and (6) avoidance of medication after proper management. As the diagnosis and management of NLUTD are complex, guidelines for clinical practice in the treatment of patients with NLUTD are mandatory.

2. Purpose

The purpose of these clinical guidelines is to provide information on the incidence, definitions, diagnosis, therapy, and follow-up observation of patients with NLUTD. These guidelines may be useful for physicians and patients in the management of NLUTD.

3. Terminology

The following abbreviations are used throughout these guidelines: AD, autonomic dysreflexia; DA, detrusor areflexia; DSD, detrusor sphincter dyssynergia; DU, detrusor underactivity; NDO, neurogenic detrusor overactivity; NLUTD, neurogenic lower urinary tract dysfunction; NVD, neurogenic voiding dysfunction; SCI, spinal cord injury.

Other terminology follows the recommendations of the International Continence Society [7,8].

4. Etiology of NLUTD

NLUTD may be caused by various diseases and events affecting the nervous systems controlling the lower urinary tract. NLUTD should be considered in patients with sudden onset of lower urinary tract symptoms (LUTSs) such as acute urinary retention or urge urinary incontinence (UUI). The following are possible etiologies of NLUTD. (1) Peripheral neuropathy: diabetes [9], alcohol abuse [10], and herpes zoster [11]. (2) Latrogenic: abdominoperineal resection of the rectum or uterus [12,13]. (3) Demyelinization: MS [14–16]. (4) Dementia: Alzheimer, Binswanger, Nasu, and Pick diseases [17–19]. (5) Basal ganglia pathology: PD, Huntington disease, and Shy–Drager syndrome [20,21]. (6) Cerebrovascular pathology [22,23]. (7) Frontal brain tumors [24]. (8) Spinal cord lesions: traumatic, vascular, medical, or congenital [25–27]. (9) Disc disease [28,29]. (10) Regional spinal anesthesia [30].

5. Epidemiology of SCI in Taiwan

The incidence of SCI worldwide, as reported in the literature, ranges from 12.1 per million to 57.8 per million [31]. Bladder dysfunction occurs depending on the level and location of the SCI [32]. The most common etiologies of SCI are motor vehicle crash injuries in patients under 60 years of age and falls in those older than 61 years [33].

A study of the prevalence and incidence of NDO from SCI in Taiwan during 2006–2008 revealed an overall 3-year prevalence rate of 855 per million and an incidence rate of 241 per million person-years, which were similar to a previous study (246 per million person-years) and much higher than those in Japan (124 per million person-years), Canada (53 per million person-years), and the USA (40 per million person-years, 59 per million person-years) [34]. The frequency of NDO was around 16.9% in SCI patients with transient urinary incontinence and 17.5% in those with permanent NDO. Among all SCI patients, 82% with SCI and NDO used catheterization with (46%) or without (36%) pharmacological treatment. Patients with SCI and NDO have more expenses for hospitalization than those without NDO. This has a great impact on the financial burden of health insurance.

6. Clinical symptoms and urodynamic findings in NLUTD patients

6.1. Cerebral vascular diseases

The clinical symptoms of NLUTD depend on the levels of lesions [35]. With lesions above the brain stem, involuntary bladder contractions with sphincter synergy and preserved bladder sensation can occur, and NDO is likely to develop. Urinary incontinence is the most common problem in the acute phase (within 3 months post CVA). The degree of incontinence declines over time. However, other voiding issues might appear. LUTSs, especially storage symptoms such as frequency and urgency with or without UUI, commonly present in the chronic phase (3 months post CVA) [23,36,37].

Because most men with CVAs are elderly, other pathophysiology that causes male LUTSs, such as bladder outlet obstruction, might confuse the diagnosis and treatment of voiding dysfunction in them [38,39]. However, patients with chronic CVAs may have both detrusor overactivity (DO) and uninhibited relaxation of the urethral sphincter causing urinary incontinence [40,41]. Detrusor underactivity (DU) and detrusor hyperactivity with impaired detrusor contractility might be other problematic issues in elderly patients with multiple CVAs or those in the acute phase [42,43].

Urethral sphincter pseudodyssynergia may develop in about 10% of patients during the recovery phase (4–10 months post CVA) [42,43]. Urethral sphincter pseudodyssynergia is characterized by voluntary contraction of the external sphincter during involuntary detrusor contractions [44]. Patients might have LUTSs such as difficult urination, slow stream, and incomplete bladder emptying.

6.2. Parkinson's disease

PD is the second most common neurodegenerative disease after Alzheimer's disease [45], affecting 1 million people each year in the United States [46]. More than 270,000 people in Taiwan have Parkinson's syndrome, and among them 40,000 have PD [47]. PD is a multisystem disorder involving the dopaminergic, noradrenergic,