

Establishing a Multidisciplinary Approach to the Management of Neurologic Disease Affecting the Urinary Tract

Shree Agrawal, BS^{a,*}, Ravi R. Agrawal, BA^b,
Hadley M. Wood, MD^c

KEYWORDS

• Neurogenic bladder • Multidisciplinary care • Neurologic diseases

KEY POINTS

- Patients with neuropathic bladder often demonstrate multisystem disease that requires interdisciplinary management to minimize polypharmacy and side effects.
- A complete urologic history includes operative procedures, urologic management, bowel management, neurologic management, and a clear understanding of what the patient's goals are.
- Preoperative and perioperative management necessitates neurologic assessment to assess ventriculoperitoneal shunt status, cardiopulmonary evaluation, or gastroenterologic evaluation.
- Decubitus ulcers and skin breakdown occur in conjunction with urologic demise, and plastic surgery, physiatry and others may help prevent and treat this outcome.
- Coordination with nephrology to monitor and treat preventable causes of renal deterioration and navigate the complexities of progression to end-stage renal disease and transplantation can be important.

INTRODUCTION

Neurogenic lower urinary tract dysfunction (NLUTD) can substantially impact quality of life in patients with neurologic diseases. Broadly categorized, NLUTD includes acquired, degenerative, and congenital conditions. The management of NLUTD aims to avoid or minimize complications such as recurrent urinary tract infections, urinary incontinence, urethral strictures, and renal deterioration.¹ Coordinated multidisciplinary care for the

management of patients with neurologic conditions and secondary NLUTD can optimize long-term patient quality of life and urologic outcomes. Examples of acquired neurologic conditions include cerebrovascular injury and traumatic spinal cord injury (SCI). Degenerative conditions associated with NLUTD include mostly primary neurologic diseases (multiple sclerosis, myasthenia gravis, and Parkinson's disease) and common congenital neurologic diseases causing NLUTD are spina bifida and cerebral palsy.

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^a Case Western Reserve University School of Medicine, 2109 Adelbert Road, Cleveland, OH 44106, USA;

^b Boston University, One Silber Way, Boston, MA 02215, USA; ^c Glickman Urological and Kidney Institute, Cleveland Clinic, 9500 Euclid Avenue, Q10-1, Cleveland, OH 44195, USA

* Corresponding author.

E-mail address: shree.agrawal@case.edu

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Patients with NLUTD, depending on their underlying predisposing etiology, have a greater risk of recurrent urinary tract infection, upper urinary tract and lower urinary tract deterioration and calculi, and skin and wound breakdown with their associated complications.² Symptoms of NLUTD, and potentially sexual dysfunction, may develop many years after diagnosis owing to deterioration of neuromuscular function.^{3,4} For patients with childhood-onset and congenital forms of NLUTD, obstacles transitioning patients between pediatric and adult providers can result in a lapse of preventative services and secondary severe complications, such as advanced renal failure, decubitus ulcers, and sacral osteomyelitis.^{5,6}

There are no guidelines established in North America for multidisciplinary care of NLUTD, especially over the lifespan of patients with neurologic conditions. This article reviews considerations for a multidisciplinary approach to care of patients with congenital and acquired NLUTD.

UROLOGIC ASSESSMENT

Patients presenting with any neurologic disease to a urologist should be assessed at minimum with a thorough history and physical examination—additional testing may include urodynamic testing, voiding cystogram, retrograde urethrogram, renal scan, cystoscopy, and/or select other diagnostic testing depending on the patient's presenting symptoms and prior history. Important factors to elicit in a history include past and present sexual, bowel, neurologic, and urologic histories at the time of consultation. **Box 1** demonstrates a typical history, not including a review of systems, in the subjective assessment of a patient presenting with NLUTD.

A physical examination should include a pelvic examination in female patients, digital rectal examination in male patients, perineal and S2 to S5 sensations, anal sphincter tone, and neurologic examination for upper and lower motor neuron deficits of the lower lumbar and sacral nerves.⁷

Urodynamic testing with warm fluid (contrast or saline, depending on whether video imaging is used) is frequently used to assess lower urinary tract dysfunction often after a voiding diary, post-void residual urine volume, and urinalysis have been completed and suggest NLUTD. Bladder compliance, detrusor overactivity, bladder sensation, detrusor function, leak point pressures, and sphincter function are all quantified on urodynamic testing.⁸ Fluoroscopic analysis may also be performed to visualize both the bladder and urethra during urodynamic testing to assess bladder capacity and shape, as well as the presence of

vesicoureteral reflux or detrusor sphincter dyssynergia.⁹ Additional upper urinary tract imaging may be performed if the clinical history suggests a risk for upper urinary tract deterioration. For example, patients with high postvoid residuals, urodynamic evidence of poor compliance, suspicion of detrusor sphincter dyssynergia (eg, retention and stuttering stream), or declining renal function by serial serum creatinine all merit upper urinary tract evaluation, typically with renal ultrasound examination at a minimum. Retrograde urethrogram or cystoscopy can be used to evaluate urethral problems. Cystoscopy further can be used to examine the bladder neck and bladder, to evaluate for foreign objects, diverticuli, mucosal lesions, functional integrity of the bladder neck and external sphincter, and evaluate for anatomic variations.

APPROACHES TO MULTIDISCIPLINARY CARE

Patients with NLUTD often demonstrate multi-system conditions that require treatments that may impact other organ systems. Among a spinal cord injured population, up to 72% of patients experience urologic problems, 50% with bowel problems, 42% with skin problems, 66% complained of limb spasticity, and 55% did not have adequate pain control.¹⁰ Specialty involvement in the management of NLUTD may include urology, nephrology, neurology, neurosurgery, gastroenterology, physiatry, physical and/or occupational therapy, wound care, plastic surgery, primary care, internal medicine, gynecology, cardiovascular medicine, and pulmonary care. The involvement of each specialty may vary to a degree, depending on the etiology of the primary condition and each individual's coexisting comorbidities and disease manifestations. Although an exhaustive review of all of these possibilities is not possible in this article, herein we highlight some specific examples where urologic decision making for patients with NLUTD is substantially impacted by other medical disciplines (**Fig. 1**).

Urology

Urologic management at the initial consultation should be performed as described elsewhere. In addition to a thorough history, a reliable estimate of glomerular filtration rate and upper tract imaging is prudent in any patient with a concern for NLUTD at baseline. Among patients with storage dysfunction or compliance problems, behavioral management, antimuscarinic agents, desmopressin, onabotulinumtoxin A injections to the detrusor muscle tissue, neuromodulation, bladder augmentation, and urinary diversion are potential therapeutic

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