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		Introduction	Giulio Del Popolo
		Suprasacral SCI - CBD	David Ginsberg
		Parkinson's disease - CBD	Pawan Vasudeva
		Multiple Sclerosis - CBD	Tufan Tarcan
		Cauda Equina - CBD	Giulio Del Popolo
		Intermittent Catheterisation in Neurogenic Patients	Diane Newman
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Aims of Workshop

Neurourology is still an evolving field and healthcare providers often find it challenging to tackle the multifactorial issues faced by people with a neurological abnormality. This workshop will try to simplify the evaluation and management principles involved in the treatment of neurogenic lower urinary tract dysfunction (NLUTD) with emphasis on the latest techniques. This will be a case based workshop to put the principles into practice and demonstrate the application of management principles. Cases will be based on the most frequent neurological diseases that impact LUT function. The aim would be for the participants to establish a clear thought process for managing this complex group of patients with confidence.

The goal of the section focusing on suprasacral spinal cord injury will be to appreciate the various ways lower urinary tract function can be impacted and how patients with NLUTD secondary to spinal cord injury should be evaluated. In addition, the attendees should gain an appreciation of risk stratification, need for surveillance and treatment options. Lastly, management of autonomic dysreflexia and recurrent UTI will be covered as well.

Learning Objectives

Understand the management principles in Neurourology in patients with different neurological disease. Detail use and complications of intermittent catheterization in this population.

Target Audience

Urology, Urogynaecology and Female & Functional Urology, Conservative Management, Neuro-Urology, Neurology, Rehab

Advanced/Basic

Intermediate

Suggested Learning before Workshop Attendance

Chapter on Neurourology in 6th ICI Consultation
EAU guidelines on Neurourology

Pawan Vasudeva

Parkinson's disease - CBD

Bladder dysfunction is one of the most common autonomic disorders in patients with Parkinson's disease (PD). The prevalence of lower urinary tract symptoms in patients with PD ranges from 38% to 71%, with storage symptoms predominating. Nocturia is the most prevalent symptom (close to 2/3rd of patients with PD), followed by urgency and frequency. Urinary incontinence is seen in about 1/4th of PD patients. Voiding symptoms can also occur, though post void residuals are usually minimal. The goal of the section on PD will be a) To understand the evaluation of PD patients with LUTS including the role of non invasive and invasive urodynamics b) To appreciate the management strategies including role of conservative measures, electrical therapy, oral drug therapy and also invasive therapy.

Tufan Tarcan

Multiple Sclerosis - CBD

Multiple sclerosis (MS), is a progressive neurological autoimmune disease leading to neurogenic lower urinary tract dysfunction (N-LUTD). MS can affect any part of the central nervous system (CNS). It is typically a disease of younger adults with a female dominance of 3–4 times more than males. N-LUTD occurs in up to 90% of MS patients during the course of the disease causing lower urinary tract symptoms (LUTS). LUTS may frequently include urgency and urge urinary incontinence usually accompanied by incomplete bladder emptying and/or hesitancy affecting their quality of life. N-LUTD in MS can also lead to upper urinary tract deterioration, especially in advanced stages of the disease. About 10-15% of patients may even present to urology clinics with LUTS due to MS prior to the diagnosis of the disease. Therefore, MS should always be considered in the differential diagnosis of young adults with unexplained LUTS.

Urodynamic studies (UDS) play a crucial role in the diagnostic evaluation and management. The most common urodynamic finding is neurogenic detrusor overactivity (NDO) seen in more than half of the patients. Detrusor sphincter dyssynergia (DSD) is the next most common urodynamic finding followed by detrusor underactivity. It has been shown that cervical lesions are associated with DSD whereas, urinary incontinence and weak stream are linked to the lesions in the cerebellum and pons.

The first line management of LUTS associated with NDO includes conservative measures such as life style changes, diet modification and pelvic floor muscle training (PFMT) and medical treatment utilizing antimuscarinics and recently, beta3 adrenergic agonists. The refractory cases are further managed with intravesical botulinum neurotoxin A (BoNT-A) injection or sacral neuromodulation (SNM). Reconstructive surgical options such as bladder augmentation or urinary diversion are usually considered as the last resort.

Patients with DSD constitute a more challenging group to treat. Clean intermittent catheterization (CIC) remains to be the primary and most commonly utilized treatment for managing DSD-related symptoms and to protect the urinary tract. Although, particularly in women, the evidence on the use of alpha-blockers remain modest alpha-blockers are usually considered to be the first-line pharmacological treatment for DSD. Oral baclofen, due to its low permeability across the blood-brain barrier has a limited role in the management of MS-related DSD. Intrathecal baclofen delivery may overcome this drawback however, this option still lacks high level of evidence and long-term results. Intrasphincteric injections of BoNT-A are reported to have good efficacy with few adverse effects. However, the evidence is still limited due to lack of RCTs and, the optimal dose and mode of injection is still under debate.

It should be kept in mind that MS is a progressive disease and it is necessary to reassess MS patients in order to adjust their therapies during the course of the disease.

Suggested Readings:

1. Çetinel B, Tarcan T, Demirkesen O, Özyurt C, Şen İ, Erdoğan S, Siva A: Management of Lower Urinary Tract Dysfunction in Multiple Sclerosis: A systematic review and Turkish Consensus Report. *Neurourol Urodyn* 2013; 32(8):1047-57.
2. Averbek MA, Iacovelli V, Panicker J, Schurch B, Finazzi Agrò E. Urodynamics in patients with multiple sclerosis: A consensus statement from a urodynamic experts working group. *Neurourol Urodyn*. 2020 Jan;39(1):73-82.

Giulio Del Popolo

Spina Bifida

Spina Bifida (SB), is a congenital neurological disorder due to an incomplete formation of the neural tube and subsequent herniation of the spinal cord which leads to neurogenic lower urinary tract dysfunctions (N-LUTD). It is defined open with more involvement of nervous tissue when it's visible at the birth, or occulta which often diagnosed in childhood or adulthood. The prevalence in Europe ranges from 1.3 to 35.9 per 10.000 and in the U.S. from 1.4 to 27.9 cases per 10.000. N-LUTD occur in up to 90% of SB patients. The urodynamic findings are various such as: neurogenic detrusor overactivity (NDO) and/or reduced bladder compliance, detrusor underactivity combined with intrinsic distal sphincter incompetence. Thus, lower urinary symptoms (LUTS) may frequently include urinary incontinence usually accompanied by incomplete bladder emptying. In about 25% of patients N-LUTD in SB are associated to a high risk of vesico-ureteral reflux and kidney damage because of low bladder compliance. Therefore, urodynamic plays a crucial role not only in the diagnostic evaluation but also for the assessment of risk for the upper urinary tract deterioration and choice of bladder management.

The first-line treatment includes conservative measures such as life style and behavior changes, antimuscarinics to control intradetrusor pressure often in combination with intermittent catheterization to ensure the proper bladder emptying. The refractory cases are managed with intradetrusor injection of botulinum toxin A (BoNT-A). Few cases treated with sacral neuromodulation (SNM) are reported in literature (off label). Surgical treatment for neurogenic stress urinary incontinence, sling or artificial sphincter, is at high risk of unsuccess and/or complications. Finally, bladder augmentation or urinary incontinent diversion must be taken in consideration after failure of the previous treatments in high risk of patients with signs of upper urinary tract deterioration and/or kidney damage.

- 1) Summary of European Association of Urology (EAU) Guidelines on Neuro-Urology. Groen J, Pannek J, Castro Diaz D, Del Popolo G, Gross T, Hamid R, Karsenty G, Kessler TM, Schneider M, Hoen L, Blok B; *Eur Urol*. 2016 Feb;69(2):324-33.
- 2) Adolescence transitional care in neurogenic detrusor overactivity and the use of OnabotulinumtoxinA: clinical algorithm from an Italian consensus statement. Palleschi G, Mosiello G, Iacovelli V, Musco S, Del Popolo G, Giannantoni A, Carbone A, Carone R, Tubaro A, De Gennaro M, Marte A, Finazzi Agrò E. *Neurourol Urodyn*. 2018 Mar;37(3):904- 915.
- 3) Value of urodynamic findings in predicting upper urinary tract damage in neuro-urological patients: A systematic review. Musco S, Padilla-Fernández B, Del Popolo G, Bonifazi M, Blok BFM, Groen J, 't Hoen L, Pannek J, Bonzon J, Kessler TM, Schneider MP, Gross T, Karsenty G, Phé V, Hamid R, Ecclestone H, Castro-Diaz D.; *Neurourol Urodyn*. 2018 Jun;37(5):1522-1540.
- 4) Efficacy and Safety of Surgical Treatments for Neurogenic Stress Urinary Incontinence in Adults: A Systematic Review. Musco S, Ecclestone H, 't Hoen L, Blok BFM, Padilla-Fernández B, Del Popolo G, Groen J, Pannek J, Kessler TM, Karsenty G, Phé V, Sartori AM, Castro-Diaz D, Rizwan H. *Eur Urol Focus*. 2021 Sep 8:S2405-4569(21)00222-4.

Diane Newman

Intermittent Catheterisation in Neurogenic Patients

Intermittent catheterization (IC) remains the treatment of choice for patients with difficulty emptying their bladder due to its wide availability and minimally invasive nature. IC is widely available, minimally invasive, and perceived as an easy and painless procedure, with limited impact on daily activities with resultant improvements in quality of life (QoL). IC has become the standard of care for management of patients with chronic neurogenic or non-neurogenic lower urinary tract dysfunction (NLUTD), who have adequate hand function or caregiver support is intermittent self-catheterization. Performing intermittent self-catheterization (ISC) can be technically difficult for in certain patients. Initial assessment of factors that can affect successful ISC and contribute to the choice of catheters includes determining a reasonable level of cognition and dexterity; good physical ability; motivation; ability to visualize the urethral meatus; capacity to follow verbal and non-verbal instructions and read and understand written instructions; awareness of problems associated with ISC; and an understanding of how to avoid problems, such as catheter-associated UTIs. The use of validated questionnaires to determine problems related to ISC should be considered by clinicians teaching IC.

- Engberg, S., Clapper, J., McNichol, L., Thompson, D., Welch, V.W., & Gray, M. Current evidence related to intermittent catheterization: A scoping review. *Journal of Wound, Ostomy, Continence Nursing*, 2020; 47(2), 140-165. <https://doi.org/10.1097/WON.0000000000000625>
- Gamé, X, Phé, V., Castel-Lacanal, E., Forin, V., de Sèze, M, Lam, O., Chartier-Kastler, E, Keppenne, V., Corcos, J., Denys, P., Caremel, R, Loche, C.M., Scheiber-Nogueira, C., Karsenty, G., & Even, A. Intermittent catheterization: Clinical practice guidelines from Association Française d'Urologie (AFU), Groupe de Neuro-urologie de Langue Française (GENULF), Société Française de Médecine Physique et de Réadaptation (SOFMER) and Société Inter -disciplinaire Francophone d'UroDynamique et de Pelvi-Périnéologie (SIFUD-PP). *Progrès en Urologie*, 2020, 30(5), 232-251. <https://doi.org/10.1016/j.purol.2020.02.009>
- Newman, D.K. Intermittent self-catheterization patient education checklist. *Urologic Nursing*, 2021; March-April, 41(2); 97-109.
- Roberson, D., Newman, D.K., Ziembra, J.B., Wein, A., Stambakio, H., 1Hamilton, R.G., Callender, L., Holderbaum, L., King, T., Jackson, A., Tran, T., Lin, G., Smith, A.L. Results of the patient report of intermittent catheterization experience (price) study. *Neurourol Urodyn*. 2021 Sep 13.doi: 10.1002/nau.24786. Online ahead of print. PMID: 34516673