W21: ICS Core Curriculum (Free): How can urodynamics help me in my clinical practice?

Workshop Chair: Enrico Finazzi Agrò, Italy
04 September 2019 09:00 - 12:00

Start	End	Topic	Speakers
09:00	09:05	Introduction	Enrico Finazzi Agrò
09:05	09:15	How to evaluate a female patients with SUI before surgery in a urodynamic lab	Alex Digesu
09:15	09:25	The real value of urodynamics in female SUI	Enrico Finazzi Agrò
09:25	09:50	Discussion + clinical cases	Alex Digesu Alexandre Fornari
09:50	10:00	LUTS in males <40 years old	Eskinder Solomon
10:00	10:10	LUTS in males >40 years old	Marcus Drake
10:10	10:20	Post-prostatectomy incontinence	Michael Guralnick
10:20	10:50	Break	None
10:50	11:10	Discussion + clinical cases	Eskinder Solomon Marcus Drake Michael Guralnick
11:10	11:20	Urodynamics of Multiple Sclerosis, Parkinson, MSA	Tufan Tarcan
11:20	11:30	Urodynamics of Spinal Cord Lesions	Luis Abranches-Monteiro
11:30	12:00	Discussion + clinical cases	Tufan Tarcan Luis Abranches-Monteiro Jian Guo Wen

Aims of Workshop

This workshop, organized by the ICS Urodynamics Committee, is intended to discuss when and how to perform different urodynamic investigations in clinical practice. The workshop will provide informations about aims and methods of commonly used urodynamic tests. The workshop will discuss limits and potentials of the urodynamic investigations in different indications, providing to the audience the best available information, to understand the present role of these tests. The workshop is intended for professionals (urologysts, gynecologists, rehabilitation physicians, nurses or other) who are treating functional pathologies of the lower urinary tract and want to improve their knowledge on urodynamic investigations.

Learning Objectives

Improve knowledge on indications of the urodynamic tests

Target Audience

Urology, Urogynaecology, Conservative Management

Advanced/Basic

Intermediate

Suggested Learning before Workshop Attendance

1: Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, van Kerrebroeck P, Victor A, Wein A; Standardisation Subcommittee of the International Continence Society. The standardisation of terminology of lower urinary tract function: report
from the Standardisation Sub-committee of the International Continence Society. Neurourol Urodyn. 2002;21(2):167-78. PubMed PMID: 11857671.
2: Gammie A, Clarkson B, Constantinou C, Damaser M, Drinnan M, Geleijnse G, Griffiths D, Rosier P, Schäfer W, Van Mastrigt R; International Continence Society Urodynamic Equipment Working Group. International Continence Society guidelines on urodynamic equipment performance. Neurourol Urodyn. 2014 Apr;33(4):370-9. doi: 10.1002/nau.22546. Epub 2014 Jan 4. PubMed PMID: 24390971.
3: Rosier PF, Kirschner-Hermanns R, Svihra J, Homma Y, Wein AJ. ICS teaching module: Analysis of voiding, pressure flow analysis (basic module). Neurourol Urodyn. 2016 Jan;35(1):36-8. doi: 10.1002/nau.22660. Epub 2014 Sep 11. PubMed PMID: 25214425.
4: Asimakopoulos AD, De Nunzio C, Kocjancic E, Tubaro A, Rosier PF, Finazzi-Agrò E. Measurement of post-void residual urine. Neurourol Urodyn. 2016 Jan;35(1):55-7. doi: 10.1002/nau.22671. Epub 2014 Sep 22. PubMed PMID: 25251215.
5: Gammie A, D'Ancona C, Kuo HC, Rosier PF. ICS teaching module: Artefacts in urodynamic pressure traces (basic module). Neurourol Urodyn. 2017 Jan;36(1):35-36. doi: 10.1002/nau.22881. Epub 2015 Sep 15. Review. PubMed PMID: 26372678.
6: Tarcan T, Demirkesen O, Plata M, Castro-Diaz D. ICS teaching module: Detrusor leak point pressures in patients with relevant neurological abnormalities. Neurourol Urodyn. 2017 Feb;36(2):259-262. doi: 10.1002/nau.22947. Epub 2015 Dec 23. Review. PubMed PMID: 26693834.

7: D'Ancona CAL, Gomes MJ, Rosier PFWM. ICS teaching module: Cystometry (basic module). Neurourol Urodyn. 2017 Sep;36(7):1673-1676. doi: 10.1002/nau.23181. Epub 2016 Nov 28. Review. PubMed PMID: 27891659.
8: Krhut J, Zachoval R, Rosier PFWM, Shelly B, Zvara P. ICS Educational Module: Electromyography in the assessment and therapy of lower urinary tract dysfunction in adults. Neurourol Urodyn. 2017 Apr 18. doi: 10.1002/nau.23278. [Epub ahead of print] Review. PubMed PMID: 28419532.
9: Schäfer W, Abrams P, Liao L, Mattiasson A, Pesce F, Spangberg A, Sterling AM, Zinner NR, van Kerrebroeck P; International Continence Society. Good urodynamic practices: uroflowmetry, filling cystometry, and pressure-flow studies. Neurourol Urodyn. 2002;21(3):261-74. PubMed PMID: 11948720.
10: Rosier PFWM, Schaefer W, Lose G, Goldman HB, Guralnick M, Eustice S, Dickinson T, Hashim H. International Continence Society Good Urodynamic Practices and Terms 2016: Urodynamics, uroflowmetry, cystometry, and pressure-flow study. Neurourol Urodyn. 2017 Jun;36(5):1243-1260. doi: 10.1002/nau.23124. Epub 2016 Dec 5. Review. PubMed PMID: 27917521.

09:05 - 09:15 How to evaluate a female patients with SUI before surgery in a urodynamic lab
Alex Digesu

A full diagnostic evaluation of urinary incontinence requires a medical history, physical examination, urinalysis, voiding diaries, assessment of quality of life, cough stress test, pad test, uroflowmetry, pelvic floor imaging and, when initial conservative treatments fail, invasive routine and ambulatory urodynamics, urethral pressure profilometry.

The cough stress test is usually performed in the standing position at a bladder volume of 300 mL or at maximum cystometric capacity if it was less than 300 mL. The results of the cough stress test are recorded as positive if urine loss occurred with a cough or as negative if no urine loss was seen and the bladder volume was recorded. The cough stress test appears to be a reliable test. The reliability is more consistent in women with a diagnosis of urodynamic stress incontinence.

Pad testing is a non-invasive method of detecting and quantifying severity of urine leakage. The 4th International Consultation on Incontinence defined pad testing as ‘‘an optional test for evaluation of urinary incontinence.’’ Diverse testing durations have been reported in the literature and only for the 1-hr pad test a specific test protocol has been standardized. Although it is generally believed that longer tests are more reproducible, evidence on the accuracy of different methods of pad testing is inconsistent. A 24-hr test is more reproducible then a 1-hr test, but longer testing requires more preparation and a greater commitment on the part of the patient. A 24-hr testing is reported to be adequate in routine clinical settings while 48- to 72-hr testing is deemed necessary for clinical research. Performing this test in conjunction with a voiding diary, or simply recording fluid intake and frequency of incontinence episodes, will significantly increase its utility. A standard protocol for 24- to 72-hr pad testing does not exist at the present time. Despite the above limitations, the pad test provides objective assessment of involuntary urine loss.
Cystometry is the method by which the storage function of the lower urinary tract (LUT) is measured during the filling of the bladder. The aim of urodynamics is to find an objective, pathophysiological, explanation for the patient's LUT symptoms. Urodynamics is a replication of the LUT physiology in a laboratory situation and it is still considered the golden standard for LUT storage function assessment.

An analysis of and information on procedures available for the ambulatory setup in women with stress urinary incontinence will be presented.

09:15 - 09:25 The real value of urodynamics in female SUI
Enrico Finazzi Agrò

The role of urodynamic investigation (UDI) before surgery for stress urinary incontinence (SUI) in female patients has been widely discussed in the last years. Although UDI used to be considered mandatory before surgery in all female patients affected by SUI according to several guidelines or recommendations, there was a lack of clear demonstrations on its role in improving clinical outcomes and clinical decision making.

Two systematic reviews on this subject have been published. In the first one, Clement et al. concluded that while urodynamics may change clinical decision-making, there is “some high quality evidence that this did not result in lower urinary incontinence rates after treatment”. In the second one, Rachaneni et al. stated that UDI do not improve outcomes “in women undergoing primary surgery for SUI or stress-predominant MUI without voiding difficulties”. These two systematic reviews included few papers and most of the patients analyzed came from the ValUE study.

This sort of conclusions should be properly analyzed focusing on the type of stress incontinence (uncomplicated and complicated). Agur et al. retrospectively analyzed 6276 women with UI, from an electronic database at a tertiary referral center; only 324 (5.2%) women had pure SUI. This was largely confirmed by an Italian multicenter database that showed that only 36% of more 2053 patients could have been diagnosed as having an “uncomplicated” SUI and 64% were “complicated”, according to ValUE trial criteria. Furthermore, preoperative UDI led to the diagnosis of different type of urinary incontinence in 74.6% of

complicated vs 40% of uncomplicated SUI cases (P = 0.0001). Moreover, a voiding dysfunction on UDI was observed in 13.4% of the uncomplicated cases and in 22.5% of the complicated cases (P = 0.0001).

These considerations lead one to think about two main points. On one hand, the so-called "uncomplicated" SUI patients are a minority. On the other hand, in the majority of "complicated" patients, the urodynamic observation varies from the pre-urodynamic diagnosis much more frequently than in the "uncomplicated" patients. Thus, in ''complicated'' patients, the role of urodynamic seems not to be challenged yet and UDI seems to be highly suggested.

Furthermore, for uncomplicated patients we can say that UDI might not change the outcome but there are other parameters we need to evaluate such as an overlapping voiding dysfunction or an underlying detrusor overactivity. A tailored treatment is an essential target to obtain. UDI may prevent surgical intervention in women without SUI or with prevalent detrusor overactivity incontinence. An accurate assessment of the risks and benefits of surgery is fundamental to facilitate a correct preoperative counseling directed towards appropriate patient expectations, as well as guide the proactive management of postoperative symptoms. In particular, the presence of a pre-existing voiding dysfunction could affect the outcomes.

In conclusion, in the majority of patients (the "complicated" ones) the role of UDI has not been fully evaluated. Maybe UDI itself can expand our knowledge in those conditions where pathology is variable, uncertain and multifactorial and where the "evidence-based" methods are difficult to satisfy.

09:50 - 10:00 LUTS in males <40 years old
Eskinder Solomon

Although "young" men with lower urinary tract symptoms (LUTS) are not uncommon, they are often misdiagnosed as having chronic prostatitis or psychogenic voiding dysfunction due to negative physical or laboratory investigation findings. These men are typically empirically treated with antibiotics, antimuscarinic, β3-AR agonist and/or α-blockers with unpredictable response rates.

Unlike in older men, LUTS in "young" men have a variety of underlying causes. These include bladder neck dyssynergia, dysfunctional voiding (non-relaxing external sphincter/idiopathic DSD), late-presentation posterior urethral valves, early-onset begin prostatic hyperplasia and urethral strictures. Detrusor overactivity and underactivity may also result secondary to chronic bladder outlet obstruction (BOO) or idiopathically.

In this section of the workshop, we will discuss how to evaluate potential BOO using video urodynamics with examples of characteristic presentations of various aetiologies. The pressure/flow study and the potential applicability of BOO nomogram in young men will also be addressed.

Young men are often bashful and anxious during urodynamic investigations limiting the validity and information that can be acquired during the test. Practical tips on how to obtain a representative study, including when to consider ambulatory urodynamics as well as how to make the UDS study as tolerable as possible will also be addressed.

10:00 - 10:10 LUTS in males >40 years old
Marcus Drake

Past the age of 40, there is an increased prevalence of benign prostate enlargement and detrusor underactivity (DUA). Consequently, the emergence of slow stream can reflect two potential contributory factors. Medical history can indicate likely factors for DUA, such as chronic diabetes mellitus. However, the main way to decide the exact mechanism of slow stream in an individual patient is to measure bladder pressure when passing urine, i.e. a pressure flow study. A high pressure with slow flow is diagnostic of bladder outlet obstruction (BOO), and is quantified by assessing the BOO Index (BOOI). This is calculated very simply by looking at the detrusor pressure at the time of maximum flow rate (PdetQmax) and the maximum flow rate (Qmax), being careful to exclude any artefacts which might mislead the numbers being used. The equation giving BOOI is PdetQmax – 2Qmax, and if this gives a number above 40 then the BOOI indicates obstruction is present. In general it is assumed that the prostate is responsible, particularly if the rectal examination finds enlargement. For the BCI, the same parameters are used, but in this case the equation is PdetQmax + 5Qmax. A value above 100 indicates normal contractility. If a man has BOOI > 40 and BCI > 100, then he has an excellent chance of improved urinary stream by doing an operation to reduce the blockage. In order to be confident about the conclusions of the urodynamic pressure flow study, it is essential to optimise the conditions of testing. The man must not be over-hydrated, they must be dealt with considerately so they are fairly relaxed, catheterisation should be gentle, and filling should not be too fast. If detrusor overactivity is seen during filling, it should be allowed to settle, and perhaps even stabilised by laying the patient flat, before the pressure flow study is started. Quality checks are essential, since the pressure-measuring catheter might become unreliable during the study; this means that cough subtraction checks should be done during filling, and also before and after voiding.

10:10 - 10:20 Post-prostatectomy incontinence
Michael Guralnick

Urinary incontinence may occur to some degree after prostate surgery (benign and malignant): in approximately 70% of men after radical prostatectomy (RP) for prostate cancer (with 1-5% of men seeking surgery for this) and 2% of men after surgery for benign prostatic hyperplasia (BPH). The most common cause is urethral sphincter deficiency due to damage/trauma/scarring of the urinary sphincter mechanism resulting in stress urinary incontinence (SUI). However, a bladder dysfunction (eg. detrusor overactivity, low bladder compliance, detrusor weakness/underactivity) may also be present in 50-70% of these men and, in a minority of post RP patients (<10%) a bladder dysfunction is the sole cause for the incontinence. The evaluation of the patient with post-prostatectomy incontinence is performed to identify the type(s) of incontinence present as well as any other lower urinary tract symptoms/pathology. A history and physical exam are essential in this regard, as is urine testing to rule out infection and hematuria. Voiding diaries and pad testing provide a quantitative assessment of the patient's urinary habits and help assess the magnitude of the incontinence. Endoscopy may be performed to rule out urethral and intravesical pathology (stricture, tumor). Formal urodynamic testing (UDS) to assess the functioning of the lower urinary tract (bladder, sphincter) may be of value in helping to identify the type(s) of incontinence (when the diagnosis uncertain based on the history and physical exam) and associated lower urinary tract pathology. The filling phase of UDS (cystometogram, CMG) provides information on bladder capacity and compliance/storage pressures, the presence of detrusor overactivity and the presence of stress urinary incontinence (via stress testing/leak point pressure testing) while the voiding phase (pressure-flow study, PFS) assesses for the presence of bladder outlet obstruction and provides information on detrusor contractility (i.e. presence/absence of detrusor weakness/underactivity) and bladder emptying. While not essential in the initial conservative management of the patient with post-prostatectomy incontinence, UDS identification of the specific type(s) of incontinence and associated bladder dysfunction may be helpful to guide patients to appropriate surgical therapies for the incontinence. Furthermore, the UDS identification of serious bladder dysfunction (e.g. very low bladder compliance), may warrant more aggressive management of that dysfunction prior to surgical treatment of the more common sphincter deficiency; at a minimum, it may prompt closer monitoring of the issue over time. While the UDS techniques in the post-prostatectomy patient are essentially the same as for any UDS, some modifications may be required in order to optimize the chances of identifying the various dysfunctions of concern.

11:10 - 11:20 Urodynamics of Multiple Sclerosis, Parkinson, MSA
Tufan Tarcan

Multiple sclerosis (MSA), Parkinson's disease (PD), Dementia, and Multiple System Atrophy (MSA) have been classified in the last ICI as acquired, progressive conditions of brain and brainstem leading to neurogenic lower urinary tract dysfunction (N-LUTD). MS and MSA are conditions that can arise in more than one region of the CNS. Urodynamic studies are considered gold standard evaluation methods for N-LUTD. However, there is no single algorithm that works best for all patients with N-LUTD, even in the same subgroup, since the underlying neurogenic deficit may be quite heterogenous in terms of severity, natural progress, clinical symptoms and signs and consequently, of the risk for upper urinary tract deterioration. Unfortunately, most of the evidence on LUTD comes from studies in patients with SCI and myelodysplasia.

MS is an immune-mediated neuroinflammatory and neurodegenerative disease of the central nervous system with a heterogeneous clinical presentation and course and is the leading non-traumatic neurological cause of disability in young and middle-aged people. The prevalence of LUTD in patients with MS is about 50–90%. Furthermore, the incidence of LUTD was reported to be related to the disability status of patients; if a patient has walking difficulty, the possibility of that patient having LUTD is nearly 100%. There is much debate regarding the use of invasive urodynamics in the initial evaluation of LUTD in patients with MS. According to some authors, the initial treatment of patients with MS-related LUTD appears to be possible by a reasonable non-invasive evaluation and invasive urodynamic tests should be spared for cases of initial conservative treatment failure and/or UUT deterioration. This suggestion may be true in a very selected group of patients, but cannot be generalized to the whole MS population. The most common urodynamic abnormality in MS is detrusor overactivity (DO) which is commonly complicated by striated sphincter dyssynergia.

PD is a neurodegenerative disorder of unknown etiology that affects the dopaminergic neurons of the substantia nigra. The differential diagnosis should include MSA, progressive supranuclear palsy, cortical-basal ganglionic degeneration, vascular parkinsonism, and Lewy body dementia. LUTD occurs in 35% to 70% of patients with PD where the most common urodynamic finding is DO. The smooth sphincter is always synergic. True detrusor sphincter dyssynergia (DSD) does not occur, however, sporadic involuntary activity in the striated sphincter during involuntary bladder contractions or
a delay in striated sphincter relaxation (bradykinesia) at the onset of voluntary micturition can be urodynamically misinterpreted as DSD. Detrusor areflexia is a rare finding in PD.

It is important to remember that many cases of "PD" in the older literature may essentially have been MSA, and citations regarding urodynamic findings may therefore not be correct. MSA is a progressive neurodegenerative disease of unknown etiology. DO is the most frequent finding. Decreased compliance may accompany. As the disease progresses, difficulty in initiating and maintaining voiding may occur. In MSA, video-urodynamic studies may reveal an open bladder neck, associated with findings of striated sphincter denervation on motor unit electromyography leading to sphincteric urinary incontinence.

11:20 - 11:30 Urodynamics of Spinal Cord Lesions
Luis Abranches-Monteiro

Spinal cord lesions present an array of different urodynamic patterns depending mostly on the degree and the level of the lesion.

The aim of urinary rehabilitation of these patients involves a thorough knowledge and assessment of the neural urinary control. Dysfunction range from urinary incontinence and infection to voiding obstruction. The first are responsible for an impact on quality of life while the second, even silent can lead to upper tract deterioration.
Bladder sensations, volumes and bladder wall behavior are the most important features to appraise the storage phase, while pressure flow curves describe the voiding phase.

The urodynamic evaluation of these patients involves three important exams:
Filling and voiding cystometries,
Perineal or sphincter EMG
Video urodynamics

These urodynamic examinations test different features of the neurogenic uropathy and are to be chosen by the clinician upon the anatomy of the lesions.

Different dysfunctions are to be expected in different groups of patients. Classically are divided in:
Sacral lesions
High Supra-sacral lesions
Low supra sacral lesions
2nd neuron lesions

The resulting dysfunctions can affect bladder sensation, and bladder volume, both measured in a filling cystometry.
Bladder compliance and, bladder contractions and its magnitude are the goal of manometric cystometry. These are the result of complete or partial loss of brain control.

In supra-sacral lesions, the sacral reflexes of bladder are accompanied by a loss of sphincter synergy with detrusor leading to even higher pressures of bladder lumen and risk of upper tract dilation. This dyssynergia may affect the distal sphincter or the proximal or bladder neck, depending on the affection of sympathetic pathways to the bladder.

External or distal dyssynergia is characterized by an evidence of obstruction during detrusor contraction and a raise in perineal EMG activity. Proximal dyssynergias need imaging methods synchronous to pressure measurements as in video-urodynamics. Adding imaging, vesico-urethral reflux can be seen and at which pressure occurs.

Filling cystometry may also detect the bladder pressure at the beginning of leakage. This leakage or incontinence pressure (detrusor leak point pressure) is known to be important determining the prognosis of upper tract deterioration.

Wrap-up:

Use of simple urodynamics (filling and voiding cystometry) to evaluate:
Bladder sensation
Bladder compliance
Bladder volume
Detrusor filling behaviour
Leak point pressure
Detrusor emptying power
Outlet obstruction

And video-urodynamics
To set pressure of VU reflux
To identify level of dyssinergia