

The Clinical Evaluation of the Patient Who Requires Urodynamics

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Introduction

Urodynamic testing is a useful diagnostic tool for the evaluation of the patient with lower urinary tract dysfunction. **Before proceeding with urodynamics testing, the clinician should perform a thorough diagnostic evaluation in order to determine both the necessity of testing as well as the appropriate urodynamic study.**

This chapter will discuss the pre-urodynamic workup, current guidelines for the use of urodynamics, and patient preparation and education.

History

As with any patient, a complete history is necessary to obtain a clear understanding of the patient's complaints. The physician should inquire about the nature of the patient's symptoms (i.e., urgency, frequency, urge and/or stress incontinence, bladder pain, and dysuria), severity and duration of symptoms, degree of bother associated with the complaints, any previous therapies that have been attempted, and other relevant medical comorbidities.

Neurologic disease can often have an impact on lower urinary tract function, and it is important to review both known neurologic diagnoses as well as symptoms that would be associated with neurologic disorders. Additional important information includes the presence of dyspareunia, effect of symptoms on sexual function, history of pelvic radiation therapy, hematuria, and any prior genitourinary or gynecological surgeries. In female patients, a complete obstetric and menstrual history

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should be obtained to include parity and mode of all deliveries. All medications should be reviewed as they could potentially contribute to the patient's condition.

Standardized validated questionnaires exist to aid the clinician in evaluating symptoms, degree of bother, and quality of life [1]. Two widely used symptoms tools are the Urogenital Distress Inventory Short Form (UDI-6) and the International Consultation of Incontinence Questionnaire Short Form on Urinary Incontinence (ICIQ-UI). Additionally, the American Urologic Association Symptom Score (AUASS) and International Prostate Severity Score (I-PSS) may be extremely useful in the pre-study evaluation of patients with any type of lower urinary tract symptoms.

Physical Examination

Physical examination may identify specific findings which could contribute to or cause the symptoms of interest. Examples include pelvic prolapse, urethral diverticulum, or an abdominal/pelvic mass. Additionally, findings on exam may change one's approach to clinical management. Special care or change in management may be required for patients with compromised mobility/dexterity or compromised mental status.

A complete examination should include assessment of the abdomen, back, genitalia, perineum, rectum, and neurologic system. Specifically, one should evaluate general mental status, body mass index, physical dexterity and mobility, abnormal gait, and extremity weakness. The abdomen and flank should be examined for masses, bladder distention, and relevant surgical scars.

Both a speculum and digital exam (bimanual and anorectal) should be performed in female patients. During speculum examination, a stress test can be performed to look for stress urinary incontinence. Degree of pelvic prolapse can be assessed using the Pelvic Organ Prolapse Quantification System (POP-Q). Pelvic muscle tone and the presence of any pelvic mass should be noted. In men, the penis, scrotum, and testes should be inspected. A rectal exam will reveal resting anal tone as well as allow for examination of the prostate. Prostate exam should include evaluation for mass, enlargement, and tenderness. In both sexes, the skin of the genitalia and perineum should be examined for evidence of breakdown or infection which may result from their complaint (Table 1).

Laboratory Evaluation

Urinalysis (UA) is a useful screening and diagnostic tool that provides rapid results in the office setting. **A simple UA can be used to rule out urinary tract infection, screen for microscopic hematuria, and identify causes of secondary incontinence such as glucosuria, pyuria, and proteinuria.** Urine culture is also helpful

Table 1 Physical examination

Both	Male	Female
General mental status		
Body mass index		
Dexterity and mobility		
Abdomen, flank		
Skin		
Perineum		
Genitals	Penis	Vaginal half-speculum exam
	Scrotum	Bimanual pelvic and anorectal
	Testicles	Stress test for incontinence
	Hernia	Urethral diverticulum
	Digital rectal exam	Pelvic mass
		Pelvic muscle tone

in the diagnosis of urinary tract infection. Microscopic hematuria should not be ignored in this patient population, as urinary tract malignancy may present as new onset urinary urgency/frequency or urge incontinence—a full urologic hematuria workup may be appropriate. At times, it can be difficult in some female patients to provide a specimen that does not exhibit vaginal contamination (as evidenced by the presence of vaginal squamous epithelial cells). This can be encountered in patients with pelvic organ prolapse, obesity, and in patients who may have limited coordination. In this circumstance, it is often helpful to obtain a sample via catheterization.

The basic metabolic panel (BMP) is often used as a surrogate for renal function assessment. Although not necessary in all patients, biochemical tests for renal function are recommended in patients with urinary incontinence and known or high probability renal impairment. Some of the neurogenic bladder population is at risk for renal deterioration, and routine BMP is useful for ongoing surveillance of the upper urinary tract.

Voiding Diary

Patients should complete a voiding diary to objectively assess fluid intake, voided volume, episodes of incontinence, and voiding frequency as well as functional capacity avoiding, maximal bladder capacity, and nocturia. These diaries may document intake and voiding behavior which may be useful for patient education and for documenting both baseline symptoms and treatment efficacy. Table 2 is an example of the voiding diary used at our institution. The voiding diary has multiple advantages. It is an inexpensive test that involves the patient in their treatment program. It is also a reasonable substitute for cystometry—the largest voided volume on the voiding diary has been demonstrated to correlate with the

over 60 min (walking, climbing stairs, coughing, etc.) while wearing a pad. If the weight of the pad increases by 2–3 g over the hour, the test is considered positive.

Alternatively, patients are asked to wear pads over varying intervals of time (ranging from 1 to 72 h) and to collect and return the used pads to the physician. These pads are then weighed by the clinic and total urine volume lost is calculated, using a dry pad as baseline. Greater than 8 g of urine loss over 24 h with this method is considered a positive test.

Current research shows that the 1-h pad test has poor predictive value in the diagnosis of female urinary incontinence when compared to stress test and urine leakage [4–6]. Simply asking a woman if she is continent was as effective as performing the pad test and correlated more strongly with the patient quality of life. While useful for academic purposes and clinical trials, the 1 h pad test is tedious and inconvenient for the patient and often has poor compliance [7]. The Fourth International Consultation on Incontinence (ICI) Committee did not recommend pad tests as part of the initial evaluation in the incontinent patient [8].

Cystoscopy

Although not indicated in all patients, direct visualization of the lower urinary tract may be of some benefit to rule out urethral and bladder pathology. If justified by the history and physical, cystoscopy can help diagnose a number of conditions that may influence or cause the patients symptoms. Specific examples include urethral stricture, inflammation, urethral or bladder diverticula, anatomic defects, and foreign bodies. **In patients with microscopic or macroscopic hematuria and irritative symptoms, one must rule out malignancy as a cause prior to treatment. Cystoscopy is an essential component of the hematuria workup [9].**

In men with incontinence after radical prostatectomy (both before and after treatment), cystoscopy is vital to evaluation of the urethra when considering surgical intervention. **Cystoscopy provides valuable information about urethral sphincter function, can evaluate coaptation of the urethral mucosa with a previously placed artificial urinary sphincter, and can demonstrate urethral tissue atrophy if present.**

Other Ancillary Studies

The volume of urine left in the bladder following voiding is termed the postvoid residual (PVR) and should be evaluated in all incontinent patients [10]. The PVR evaluates the bladder's ability to empty. Knowing the patient has an elevated PVR can be helpful in diagnosing overflow incontinence. It also establishes a baseline for the patient, as both medical and surgical therapy may cause this to worsen. PVR measurement may not be necessary for uncomplicated patients if treatment is limited only to behavioral therapy.

Imaging studies are not required for most patients. However, in patients with hematuria, upper tract imaging is required to ensure the clinician does not miss a potentially harmful cause such as urothelial cancer or calculus disease [9]. In male patients in whom there is a high suspicion of urethral stricture, the clinician should obtain a retrograde urethrogram to both diagnose and define the severity of disease.

Current Recommendations from Guidelines on Indications for Urodynamics

Although urodynamic testing is a useful diagnostic tool for evaluating patients with lower urinary tract dysfunction, some patients may not need the full spectrum of tests available. In fact, some patients may not require urodynamic testing at all after the clinical evaluation is complete. Multiple societies have published recommendations regarding the use of urodynamics. The following recommendations are a synthesis of the published guidelines from the American Urological Association, the National Institute for Health and Clinical Excellence, the International Continence Society, the American Urogynecologic Society, and the Urinary Incontinence Treatment Network [11–16].

Urodynamics not necessary—Urodynamic studies are optional in uncomplicated patients with stress incontinence. In addition, they are not necessary when starting a conservative treatment program. Patients with neurogenic bladder who are at low risk of renal complications (such as most patients with multiple sclerosis), do not need to be routinely offered urodynamic testing.

Helpful—Preoperative studies can assist to counsel patients and set realistic expectations prior to surgery. Urodynamic studies can be helpful in patients where the diagnosis remains uncertain after the initial clinical workup. It is also useful when the patient’s symptoms do not correlate with objective findings. Additional situations where urodynamics are helpful include patients with mixed symptoms or who have failed prior therapies. This includes patients with prior incontinence surgeries or prior exposure to radiation therapy. Finally, postoperative urodynamic studies can provide a useful basis for comparison to preoperative status in the event of a less than ideal treatment outcome.

Necessary—UDS should be strongly considered prior to any invasive, potentially morbid, or irreversible procedure for stress incontinence, pelvic organ prolapse, or lower urinary tract symptoms. Clinicians should perform pressure flow studies in men when it is important to definitively determine if outlet obstruction is present with lower urinary tract symptoms. Lastly, urodynamics should be utilized to establish a baseline for patients with neurogenic bladder dysfunction who will require long term urologic management. Voiding symptoms in this patient population can change over time; urodynamics allows for objective analysis and assists in directing therapy to prevent damage to the upper urinary tracts. Neurogenic bladder patients at high risk who should be considered for this include those with spina bifida, spinal cord injury, myelomeningocele, and anorectal abnormalities (Table 3).

Table 3 Recommendation for the use of UDS

Not necessary	Helpful	Necessary
Uncomplicated stress incontinence	Counseling, setting expectations prior to surgery	Prior to invasive, morbid, or irreversible procedures
Starting a conservative treatment program	Diagnosis remains uncertain after Hx, PE	In men, when it is important to determine if obstruction is present with LUTS
Patients at low risk of renal complications	Symptoms don't correlate with physical exam	Establish a baseline for patients with neurogenic bladder dysfunction
	Mixed symptomology	
	Failed prior therapies	
	Prior incontinence surgeries, or radiation	
	Basis for comparison in the event of a less-than-ideal surgical outcome	

Patient Preparation and Education

Patient preparation for urodynamic testing is essential, contributing to both the efficiency and usefulness of the test as well as to patient comfort. **Although typically well tolerated, urodynamics can generate feelings of anxiety, discomfort, and embarrassment; all of which may drastically effect the outcomes of the testing.** Prior to proceeding, all patient questions should be answered thoroughly. At our institution, patients also receive standard directions (Table 4) instructing them as to the following:

- Do not fast.
- Take regularly scheduled home medications.
- Arrive with a full bladder
- A urinalysis will be checked. If infected, the test will be rescheduled.
- Expect mild dysuria, hematuria, and/or increased bladder sensitivity for approximately 24 h after testing

At the time of procedure, informed consent should be signed and a final “time out” performed in accordance with institutional standards. Finally, patients with neurogenic bowels may need to be instructed to have a bowel cleanout the night before the procedure.

Periprocedural Antibiotic Treatment and Guidelines

For the average individual, urodynamics is minimally traumatic and has a low risk of causing urinary tract infections. Several randomized controlled trials demonstrate no reduction of infection rates with prophylaxis [17–19]. **The American**

Table 4 Patient instructions for urodynamic testing

You have been scheduled for a test called Urodynamic Testing (UDS). During this series of tests, your bladder will be evaluated for a variety of conditions.

When you arrive, you will be asked to empty your bladder on a special commode. It is important that you come with a comfortably full bladder and do not empty until you are asked to do so.

To start the examination, lidocaine jelly will be inserted into your urethra to numb it. A small catheter will be passed into your bladder and another catheter placed in your vagina (females) or rectum (males). Your bladder will be slowly filled with sterile water through this catheter and you will be asked to identify your sensation at different levels of fullness until you cannot hold any more of the water.

When you are completely full, you will be asked to urinate in order to assess how well your bladder contracts. The catheter may also be repositioned to evaluate the strength of your urethra. Rarely, this test can cause a complication or problem. Less than 1 % of people will develop a bladder infection. Temporary irritation, burning with urination or a little blood in the urine is common and generally lasts only a few hours after the test.

Your preparation for the test is important:

Please do not apply lotions, powders or sprays to the pelvic area on the day of your test. Arrive 10–15 min prior to your appointment.

Come with a comfortably full bladder and do not void until instructed to do so. (This does not apply if you have a Foley catheter or you have leakage of urine that cannot be controlled.)

If you have been asked to fill out a voiding diary in advance, bring this with you to the appointment.

You may be asked to stop medications that affect your bladder such as oxybutynin. Ask the doctor or nurse if you are not sure.

Urological Association antimicrobial prophylaxis guidelines state that antibiotic prophylaxis before urodynamics is indicated only in patients with specific risk factors [20]. These include advanced age, anatomic anomalies, poor nutrition, smoking, chronic corticosteroid use, immunodeficiency, externalized catheters, colonized materials, coexistent infection, and prolonged hospitalization. If antibiotics are used prophylactically, recommended drugs include oral fluoroquinolones or trimethoprim-sulfamethoxazole. However, the clinician should make use of local institutional antibiograms and consider patient allergies when selecting appropriate coverage.

Conclusion

Urodynamics is an important tool for the clinician who treats lower urinary tract dysfunction. **However, this testing cannot be used in isolation and does require appropriate clinical workup prior to proceeding.** With proper history, physical, and ancillary studies, the clinician can effectively select and conduct urodynamic studies to better answer clinical questions while best serving their patients.

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