THE ROLE OF AMBULATORY URODYNAMICS IN THE ASSESSMENT OF URGENCY*

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Vikram Khullar, MD, MRCOG†

ABSTRACT

The diagnosis of overactive bladder (OAB) is based on the key symptoms of urgency and urinary frequency, which could be related to abnormal bladder contraction or afferent nerve activity. The urodynamic diagnosis of detrusor overactivity can be made during either static or ambulatory urodynamics. Static urodynamic assessment occurs under nonphysiologic conditions and does not correlate with symptoms in 12% to 25% of women. Ambulatory urodynamics offers a more physiologic approach to assessment and results correlate well with OAB symptomatology. Studies also suggest that measured parameters during ambulatory urodynamic monitoring change during treatment with anticholinergic agents and the measured changes are greater than those found during static urodynamics.


Clinicians diagnose overactive bladder (OAB) by symptom-based criteria, and detrusor overactivity by a urodynamic approach. These 2 diagnoses, overactive bladder and detrusor overactivity, are related but are not exactly the same. The relative accuracy of the 2 approaches has not been compared prospectively. The 2 approaches provide different types of information by which a diagnosis can be made and may give differing information about OAB and urgency.

They might also be used in a complementary manner to provide greater diagnostic certainty. In particular, recent studies suggest that findings on ambulatory urodynamic monitoring (AUM) correlate with symptoms of OAB and urgency or urge incontinence and that AUM parameters change in a predictable manner in response to antimuscarinic therapy.

OAB DIAGNOSIS: SYMPTOMATIC VERSUS URODYNAMIC

If physicians can diagnose OAB on the basis of urinary symptoms, why should urodynamics be considered? Urodynamics are invasive and have associated morbidity from dysuria and urinary tract infection. Until recently, the diagnostic accuracy of the symptomatic approach was limited by a lack of standardized terms and definitions for OAB and, in particular, the hallmark symptom of urgency. Moreover, clinical trials have used a variety of parameters to assess and measure urgency. In 2001, the International Continence Society (ICS) adopted standardized terminology to define OAB. The ICS recognized OAB as “a symptom syndrome suggestive of lower urinary tract dysfunction.” The ICS further defined OAB as “urgency, with or without urge incontinence, usually with frequency and nocturia.” A urodynamic approach to OAB diagnosis relies on objective measures to provide a totally different type of information. Urodynamics can reveal detrusor overactivity, which might be neurogenic or idiopathic in nature.14

Current approaches to diagnosis of OAB have some notable limitations. Symptomatic diagnosis of OAB can lead to underdiagnosis of women with detrusor overactivity and to inappropriate treatment. Moreover, almost half of women with OAB symptoms do not have detrusor overactivity. Conversely, fewer than a third of women with detrusor overactivity have symptoms of OAB.5,6

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†Senior Lecturer and Consultant Urogynaecologist, St. Mary’s Hospital, Imperial College, London, UK.
Address correspondence to Vikram Khullar, MD, MRCOG, 6 College Gardens, Duchwic, London, UK SE21 7BE. E-mail: Vik.khullar@imperial.ac.uk.
The diagnostic inconsistencies cited above may be due to a difficulty in the definition of the key symptom of urgency. This means that determining the cause of urgency is important to refine these diagnoses. This issue was investigated in a study of 100 patients, 80 of whom had detrusor overactivity. The group comprised 20 women with normal bladder function (controls); 40 who had phasic detrusor overactivity associated with normal perception of bladder fullness and moderate to severe urgency with the onset of involuntary detrusor contractions. Twenty patients had uninhibited contractions without urgency at the onset of the involuntary detrusor contraction (defective perception of bladder fullness); and 20 had neurogenic detrusor overactivity resulting from intracerebral lesions.

Urodynamic assessment of the 100 women revealed different patterns of urgency associated with uninhibited detrusor contractions. In particular, women who had moderate or severe urgency and normal perception of bladder fullness had significantly more powerful contractions during voiding than did the control group or the patients with neurogenic detrusor overactivity. The difference was most pronounced in women who had severe urgency associated with involuntary detrusor contractions, as their maximum external voiding power was more than double that of the control and neurogenic groups and almost double that of the group with moderate urgency. Women who had defective perception of bladder fullness had voiding power similar to that of women with moderate urgency during a detrusor contraction. The findings suggest that the strength of the contraction correlates with the severity of urgency. This, however, may be an association rather than a causation.

The study described would favor urodynamic evaluation of patients with OAB and places an important role in detrusor contraction in the genesis of urgency. However, conventional urodynamic testing also has some limitations. Technical limitations relate to test and retest reliability and the consistency of result interpretation. Moreover, the test is not physiologic. Urgency is a chronic episodic malady that does not always manifest itself during urodynamic testing. The results of urodynamics are limited by the short observation period encompassed by conventional testing, the effects of a high filling rate, and patient embarrassment associated with the testing. Perhaps most important, results of urodynamic testing often have a poor correlation with urge incontinence or other symptoms.

AUM

AUM may offer a more accurate alternative to conventional urodynamic assessment and addresses most of the shortcomings of standard urodynamics. AUM encompasses a longer observation period and is more physiologic in that it is based on a low orthograde filling rate. The monitoring involves minimal embarrassment to the patient as the patient is fully dressed and connects herself to the flowmeter. The monitoring is not intrusive, as patients can remain ambulatory throughout the monitoring period and carry on with most routine activities. However, AUM has its own limitations as the test protocol has not been standardized. Additionally, bladder overactivity is seen on AUM in as many as 70% of asymptomatic healthy women. However, the false-positive rate decreases to 27% when AUM is targeted to patients with OAB symptoms. Additionally, bladder overactivity is seen on AUM in as many as 70% of asymptomatic healthy women. However, the false-positive rate decreases to 27% when AUM is targeted to patients with OAB symptoms.9,10

AUM and conventional, or static, urodynamic testing were compared in a randomized, crossover clinical trial involving almost 100 women for which paired test results were available. The objective of the study was to compare symptoms with each of the testing methods (AUM and conventional) in women with symptomatic urinary urgency. The 2 urodynamic test techniques were performed in random order 1 month apart. Additionally, patients maintained a 3-day urinary frequency volume chart and completed the Bristol Lower Urinary Tract Symptom questionnaire.

Conventional urodynamics were performed to ICS standards, including X-ray screening, a fill rate of 50 mL/min, and supine positioning. The patients underwent provocative testing while standing, including coughing, heel bouncing, and handwashing. Voiding was evaluated while patients were seated on a commode.

AUM was performed by means of an MMS UPS 2020 monitoring device with sampling at 8 Hz. 7-Fr Gaeltec microtip solid-state transducers were used. Before each test, the transducers were calibrated using a 50-cm column of water, and both bladder and rectal catheters were used. Patients received an oral 750-mL fluid load, followed by 3 hours of monitoring, which consisted of 1 hour of sitting quietly, 1 hour of normal activities, and then 2 provocative tests during hour 3 at least 20 minutes after voiding. The tests were repeated after 10 to 20 minutes. Provocative tests used during the study were standing from a sitting position (repeated 10 times); vigorous coughing; bending down and picking up an objective from the floor (repeated 5 times); and
washing hands for 1 minute in cold running water. Patients maintained contemporaneous symptom diaries, and a button connected to the monitor was used to record urinary events during monitoring.

Results with both types of testing were compared with the answers to the symptom-related question: Do you have to rush to the toilet to urinate? Across the range of positive answers from “occasionally” to “all of the time,” patients demonstrated higher rates of idiopathic detrusor activity during AUM than during static urodynamic assessment and these were consistent with the question on urgency severity (Figure 1).10

The study demonstrated no significant difference in fill rates of stable and unstable cycles. Urgency or urge incontinence was associated with the objective finding of idiopathic detrusor activity in more than 70% of the women on AUM, and the investigators concluded that the strong correlation warrants empirical therapy for patients with OAB. In about 30% of cases, contractions were not associated with urgency.

A small clinical study reported at the annual ICS meeting provided evidence that AUM parameters change in a predictable manner in response to antimuscarinic therapy.11 Patients underwent AUM before treatment and after 4 weeks of therapy with tolterodine. Comparing pre- and post-treatment AUM results, investigators found that maximum bladder capacity and bladder volume at first contraction increased during treatment. Amplitude of maximum contraction and duration of maximum contraction both decreased, and median urine leakage decreased from 2.4 mL to 0 mL.

More recently, in a multicenter study, AUM was used to evaluate the response to therapy in a randomized, crossover trial that compared oxybutynin and propiverine in 77 patients with OAB.12 AUM data demonstrated significant differences in favor of oxybutynin in terms of the reduction in the total number of unstable contractions and in the total number of symptomatic unstable contractions.

The evidence reviewed thus far clearly implicates bladder contraction as a contributing factor to the symptom of urgency. Whether contraction is the sole explanation for urgency remains unclear. Data from a clinical study of sacral neuromodulation for OAB suggest that afferent...
nerves also have a role in the origin of urinary urgency. The study of urgency suppression-associated bladder filling involved 35 women with urge scores ranging between 1 and 4. Treatment with neuromodulation, a form of afferent nerve stimulation, effectively suppressed the sensation of urgency and significantly increased bladder volume, compared with placebo (Figure 2). The results suggest that afferents do have a role in the genesis of urgency.

**SUMMARY**

AUM offers improved objective assessment of detrusor function and better detection of clinically important bladder overactivity, which correlates with clinical symptomatology. Stable detrusor function during static urodynamics in a patient with urgency or urge incontinence should be interpreted with caution. Measured parameters are usefully quantifiable and improve with antimuscarinic therapy in a predictable manner.

**REFERENCES**