

Review Article

The Role of Preoperative Urodynamics in Urogynecologic Procedures

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ABSTRACT Urodynamic studies refer to any tests that provide objective information about lower urinary tract function with the goal of evaluating bladder and urethral function. Pre-operative urodynamic testing is commonly performed prior to urogynecologic procedures for urinary incontinence and pelvic organ prolapse. Although the utility of preoperative urodynamics testing before urogynecologic procedures have been challenged in the literature, the preoperative utilization of urodynamic testing in women with complex voiding dysfunction or associated conditions such as prolapse or urethral diverticulum is still considered important for surgical planning and pre-operative counseling. *Journal of Minimally Invasive Gynecology* (2014) 21, 217–222 © 2014 AAGL. All rights reserved.

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Urodynamic studies refer to any tests that provide objective information about lower urinary tract function. They are used to help understand patients' lower urinary tract symptoms and assist providers in choosing the appropriate treatment for patients with urinary incontinence. Urodynamic testing can help better characterize voiding pathology and provides additional information that may not be obtained from a thorough history and physical.

Preoperative urodynamic testing is commonly performed before urogynecologic procedures for urinary incontinence and pelvic organ prolapse. Although some studies have challenged the usefulness of these tests compared with basic preoperative office evaluation in women with uncomplicated, demonstrable stress urinary incontinence, the number of women that fall into this category is relatively small in a urogynecologic referral practice [1]. Hence, the preoperative use of urodynamic testing in women with complex voiding

dysfunction or associated conditions such as prolapse or urethral diverticulum is considered to be important for surgical planning and preoperative counseling.

The purpose of preoperative urodynamic evaluation before certain urogynecologic procedures is to evaluate bladder and urethral function before surgery. Urodynamic testing not only provides an accurate picture of the functional status of the lower urinary tract, which may assist with surgical planning, but also may be useful in patient counseling for postoperative outcomes such as the development of de novo incontinence and voiding dysfunction.

Urodynamic Testing

Standard multichannel urodynamic testing consists of a series of tests that are selected and performed to evaluate bladder and urethral function. Filling cystometry is the primary test used to evaluate the storage function of the bladder, including determination of sensation and compliance during the filling phase, and evaluation for the presence of detrusor overactivity. Slow physiologic bladder filling rate during cystometry is often used to simulate the natural bladder filling. In patients with urge incontinence symptoms,

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provocative maneuvers such as increasing (nonphysiological) filling rates, coughing, changing position from supine or sitting to standing, or running water at the faucet are sometimes used to provoke detrusor overactivity.

Bladder sensations during cystometry are determined by the volume in the bladder at the patient's "first sensation of bladder filling," "first desire to void," and "strong desire to void." A strong desire to void usually defines the urodynamic cystometric capacity, which represents the bladder volume at the end of the filling cystometrogram. In the absence of sensation, cystometric capacity is the volume at which the investigator decides to terminate filling. In our institution, we terminate bladder filling at 750 mL in a patient without sensation.

Urethral pressure profilometric measurements are used to evaluate urethral closing forces. Leak point pressure measurements evaluate urethral competence against pressure generated in the bladder from detrusor or abdominal forces. Urethral pressure measurements can be taken from all points along the urethra or at 1 or more points along the urethra over a period of time during which there may be variations in the testing conditions. Urethral pressure varies with bladder volume. In continent women, urethral closure pressure tends to increase with increasing volume, whereas in stress incontinent women, it tends to decrease with increasing volume [2]. There are also variations in urethral pressures with position changes. In continent women, urethral closing pressure usually increases in the standing position, whereas in stress incontinent women, there is either no change or a decrease in pressure [3].

The intravesical pressure at which involuntary expulsion of urine from the urethra is observed is the leak point pressure (LPP). The increased intravesical pressure could originate from the detrusor during filling or from an increase in abdominal pressure. The detrusor LPP is the value of the detrusor pressure at which leakage occurs in the absence of an abdominal pressure rise. This is commonly seen in patients with neuropathic conditions. An elevated detrusor pressure value greater than 40 cm H₂O is a risk factor for upper tract deterioration especially in the presence of urinary incontinence [4]. The abdominal LPP is the value of the intravesical pressure at leakage during abdominal stress maneuvers such as coughing (coughing LPP) or Valsalva (Valsalva leak point pressure, VLPP) in the absence of detrusor contraction.

A maximal urethral closure pressure (MUCP) less than 20 cm H₂O and Valsalva leak point pressure (VLPP) of less than 60 cm H₂O are indicators of intrinsic urethral sphincter deficiency (ISD). Although the presence of ISD has been thought to be a predictor for failure in patients undergoing Burch retropublic urethropexy [5], a prospective randomized study by Sand et al [6] comparing modified Burch retropublic urethropexy and a suburethral sling showed no difference in outcome in patients with low preoperative maximal urethral closure pressure. Schierlitz et al [7] also reported a significantly greater cure rates for retropublic tension-free vaginal tape sling when compared with transob-

turator tape in women with urodynamic stress incontinence and intrinsic sphincter deficiency at a 3-year follow-up [7].

In addition, there are other urodynamic test measurements that may assist in the evaluation of voiding dysfunction. Uroflowmetry and postvoid residual volume provide information on global voiding function, pressure flow studies evaluate detrusor contractility and bladder outlet obstruction during the voiding phase, and surface electromyography offers information on coordinated relaxation of the pelvic floor during the voiding phase [8]. Other components of urodynamic testing that are available in some urodynamic laboratories include videourodynamics, which allows for simultaneous observation of the morphology and function of the lower urinary tract, and ambulatory urodynamic monitoring, which provides information on the behavior of the bladder, urethra, and leakage mechanism during activities of daily living in patients who may have suspected but not proven incontinence or detrusor overactivity on conventional investigation.

The use of other test modalities such as office cystoscopy is indicated in certain clinical scenarios as part of the evaluation of lower urinary tract symptoms. This information is useful in establishing a potential etiology of symptoms such as incontinence and may be clinically helpful in selecting the most appropriate intervention. Suspected lower urinary tract fistula (i.e., vesicovaginal or urethrovaginal), urethral diverticula, recurrent urinary tract infections, hematuria, and women with previous suburethral sling procedures are all clinical scenarios in which office cystourethroscopy may be useful preoperatively.

Prolapse

Pelvic organ prolapse, including significant anterior and/or apical prolapse, can mask underlying stress urinary incontinence because the increased abdominal pressure that provokes urinary leakage can create an anterior bulging of the vagina that can have a kinking effect on the urethra, thus preventing leakage. Similarly, posterior wall prolapse may artificially raise maximal urethral closing pressure and mask urinary stress incontinence during a cough stress test. This was made evident in a 1998 prospective observational trial by Myer et al [9], which showed that women with grade 3 posterior wall defects had significant changes in urethral closing pressure, urethral length, and leak point volume when their defect was reduced versus not reduced. As a result, the role of preoperative urodynamics with prolapse reduction is of particular importance in patients with significant vaginal prolapse to evaluate for occult stress incontinence.

One concern regarding preoperative occult incontinence evaluation is the lack of standardization of the techniques used for prolapse reduction at the time of urodynamics testing. Patient discomfort and risk of urethral occlusion represent some of the various factors that can influence the choice of prolapse reduction device. Lefevre et al [10] reported on 36 patients with advanced vaginal prolapse randomized to using the lower blade of a plastic speculum, a

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