



Clinical Evaluation of Women With Lower Urinary Tract Dysfunction

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Introduction

Urinary incontinence (UI) and overactive bladder (OAB) are the most common types of lower urinary tract dysfunction, occurring in about one-third of adult women.^{1–3} Urinary symptoms and signs in these conditions are nonspecific and often overlapping. One-third of patients with overactive bladder have urinary incontinence. The International Continence Society has recently redefined symptoms, signs, and conditions related to the lower urinary tract.⁴ Three types of urinary incontinence symptoms all include the complaint of involuntary leakage under different conditions:

- **STRESS:** On effort or exertion, or on sneezing or coughing.
- **URGE:** Accompanied by or immediately preceded by urgency (which is the sudden com-

elling desire to pass urine, which is difficult to defer).

- **MIXED:** Associated with urgency and also with exertion, effort, sneezing, or coughing.

Two urodynamic types (conditions) of urinary incontinence are:

- **URODYNAMIC STRESS INCONTINENCE:** Involuntary leakage of urine during increased abdominal pressure, in the absence of a detrusor contraction, noted during filling cystometry.
- **DETRUSOR OVERACTIVITY INCONTINENCE:** A urodynamic observation characterized by incontinence due to involuntary detrusor contractions during the filling phase, which may be spontaneous or provoked.

This chapter will discuss the role of information obtained by history, questionnaires, and diaries, as well as physical examination techniques helpful in diagnosis and management of urinary incontinence. The clinical evaluation of less common lower urinary tract conditions will also be discussed.

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History

GENERAL MEDICAL HISTORY

A complete medical history is important because many medical conditions influence bladder function and symptoms. For example, poorly controlled diabetes may cause polyuria and nocturia. Neurologic conditions such as multiple sclerosis may cause overflow incontinence and urinary retention. A history of back surgery should be recorded. Severe arthritis may contribute to functional incontinence if the patient is not sufficiently mobile to get to the bathroom in time. A simple bedside commode is helpful in such cases.

Since drugs can adversely affect the lower urinary tract in several ways, a list of current medications is very important. Older Americans take an average of four different medications per day. Up to 60% of incontinent patients are taking between one and four drugs with potentially adverse effects on the lower urinary tract. Diuretic medications and alcohol increase the rate of bladder filling. Anticholinergic drugs, beta-adrenergic agonists, and calcium channel blockers have the potential to decrease bladder contractility and may contribute to urinary retention and overflow incontinence in elderly patients. Alpha-adrenergic blockers and beta-adrenergic agonists may decrease urethral tone and aggravate urinary incontinence. See Table 1 for a more complete listing of drugs affecting lower urinary tract function.⁵

It is essential to consider factors outside the urinary tract that may influence urinary symptoms, especially in the elderly. Treatment of these conditions often restores continence, even without directly treating the urinary tract. Resnick et al⁶ summarized functional causes of incontinence as "DIAP-PERS":

D = Delirium
I = Infection
A = Atrophy urethritis or vaginitis
P = Pharmacologic agents

TABLE 1. Medications That Affect Lower Urinary Tract Function

Mechanism	Medication
Decreased urethral pressure	Antihypertensives
	Prazosin
	Terazosin
	Alpha-methyl dopa
	Reserpine
	Neuroleptics
	Thioridazine
	Chlorpromazine
	Haloperidol
	Clozapine
	Benzodiazepines
Valium	
Increased intravesical pressure	
Excess urine production	Diuretics
	Furosemide
Detrusor overactivity	Hydrochlorothiazide
	Bethanechol
Incomplete bladder emptying	Cisapride
	Anticholinergics
	Hyoscyamine
	Oxybutynin
	Antiparkinson agents
	Benzotropine
	Trihexyphenidyl
	Beta-Blockers
	Pindolol
	Diospyramide
Indirect effects	
Cough	ACE inhibitors
	Enalapril
Constipation	Iron, narcotics
	Sedation
	Alcohol, sedatives, Anxiolytics

From Steele AC. Pharmacologic Causes of Female Incontinence. *Int Urogynecol J.* 1999;10(2):106-110. By permission from Springer-Verlag Heidelberg.

P = Psychiatric disorders
E = Excess urine output (e.g., congestive heart failure, hyperglycemia)
R = Restricted mobility or dexterity
S = Stool impaction

GYNECOLOGIC HISTORY

Some epidemiologic evidence suggests that vaginal childbirth is an etiologic factor for pelvic organ prolapse and urinary incontinence. Cesarean delivery in the second stage of labor is probably not protective for these

disorders. Therefore, gravidity, parity, mode of delivery (spontaneous or operative vaginal delivery, cesarean delivery), macrosomic infants, and anal sphincter lacerations (third and fourth degree perineal lacerations or incisions) are an important part of the obstetrical history.

Desire (or lack of desire) for future childbearing is important to note, as this may influence the choice of therapy, limiting surgical options. Many clinicians recommend against pelvic reconstructive and anti-incontinence surgical procedures on patients until childbearing has been completed, although definitive studies on this practice are lacking.

Although studies have not shown a consistent benefit of estrogen in treating urinary incontinence,⁷ it may be beneficial in the presence of urogenital atrophy. Additionally, if surgery is planned, estrogen promotes the development of stronger and thicker vaginal tissues, which may facilitate repairs. Therefore, a careful history regarding hormonal therapy is needed in perimenopausal and postmenopausal patients.

Pelvic organ prolapse is frequently present in women with lower urinary tract dysfunction. Although published data have shown prolapse symptoms to be nonspecific and poorly correlated with the anatomic site of the prolapse,⁸ patients should be asked about them to comprehensively assess their baseline status. The presence of these symptoms should lead to careful examination and

TABLE 2. Symptoms Associated With Pelvic Organ Prolapse

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- Protrusion at the vaginal introitus
 - Bearing down sensation
 - Feeling of “everything falling out”
 - Lower back discomfort and aching with standing
 - Difficult intercourse because “something is in the way”
 - Partner complaining of large vagina
 - Rectal tenesmus and/or constipation
 - Digital splinting to defecate and/or urinate
-

quantification of prolapse, which will be described later in this chapter. Symptoms that may be associated with prolapse are listed in Table 2.

UROLOGIC HISTORY

The classic symptom of stress incontinence is the sudden loss of small amounts of urine with or immediately after physical exertion, sneezing, or coughing. Urge incontinence can present in different symptomatic forms, for example, as frequent small losses between voiding, or as a large-volume leak with complete bladder emptying. Symptoms of mixed incontinence can be any combination of symptoms characterized as stress or urge incontinence. The overlap in symptoms between stress, urge, and mixed incontinence is depicted in Table 3. Patients may be able to describe the amount of urine lost in terms of clothing changes or absorbent pad changes.

TABLE 3. Overlap of Symptoms with Stress, Urge, and Mixed Incontinence

Symptoms	Urge Incontinence	Stress Incontinence	Mixed Incontinence
Urgency (sudden compelling desire to pass urine, which is difficult to defer)	Yes	No	Yes
Frequency (the complaint by the patient that she voids too often by day)	Yes	No	Yes
Leaking during physical activity (eg, coughing, sneezing, lifting, etc.)	No	Yes	Yes
Ability to reach the toilet in time following an urge to void	No	Yes	No
Waking to pass urine at night	Often	Seldom	Often

The value of patient history, however, in the diagnosis of urinary incontinence based on urodynamic diagnosis is questioned in the literature, with many studies showing only 50% to 70% specificity and sensitivity. Colli et al⁹ performed a meta-analysis of published studies comparing patient history in the urodynamic diagnosis of stress incontinence. With 21 studies including 5,192 patients, mean sensitivity was 0.82 and mean specificity was 0.57 (Table 4). In a meta-analysis comparing patient history and cystometry in the diagnosis of detrusor overactivity, with 20 studies and 2,988 patients, mean sensitivity was 0.69 and mean specificity was 0.60 (Table 5). However, urodynamic testing is prone to false negatives especially in the diagnosis of detrusor overactivity.

A careful history regarding overactive bladder symptoms should be obtained.

These include frequency (the complaint by the patient that she voids too often), urgency (the complaint of a sudden compelling desire to pass urine, which is difficult to defer), dysuria, and nocturia (the complaint that the individual has to wake at night one or more times to void). Caffeine intake, a known bladder irritant, should be assessed.¹⁰ A careful history should be taken to document non-stress incontinence that could indicate possible detrusor overactivity or overflow incontinence. Nocturnal enuresis (the complaint of loss of urine occurring during sleep, commonly known as bedwetting) may also be a sign of detrusor overactivity or overflow incontinence. However, patients might be turning in bed or coughing during sleep, causing stress incontinence. Stress incontinence with minimal activity may be associated with intrinsic sphincter deficiency (a more severe degree of urethral incompe-

TABLE 4. The Role of Patient History in the Diagnosis of Urodynamic Stress Incontinence

Authors	Number of Patients	Sensitivity	Specificity	Predictive Value	
				Positive	Negative
Bent et al.	81	0.95	0.63	0.48	0.97
De Muylder et al.	408	0.94	0.65	0.80	0.89
Fischer-Rasmussen et al.	212	0.52	0.85	0.85	0.53
Glezeman et al.	128	0.95	0.14	0.84	0.38
Hilton and Stanton	100	0.58	0.58	0.48	0.67
Jarvis et al.	100	0.98	0.50	0.64	0.96
Korda et al.	537	0.97	0.22	0.74	0.77
Largo-Janssen et al.	103	0.96	0.62	0.89	0.83
Ouslander et al.	135	0.94	0.35	0.73	0.77
Phua et al.	84	0.91	0.35	0.48	0.86
Sand et al.	218	1.00	0.65	0.87	1.00
Summitt et al.	79	0.97	0.47	0.87	0.80
Thiede and Saini	196	0.86	0.36	0.89	0.29
Valente	102	0.98	0.76	0.94	0.89
Versi et al.	252	0.78	0.84	0.81	0.81
Walters and Shields	106	0.95	0.28	0.75	0.69
Sandvik et al.	131	0.66	0.88	—	—
Versi et al.*	149	0.92	0.72	0.83	0.86
Cundiff et al.	351	0.44	0.82	0.87	—
Haeusler et al.	1630	0.56	0.45	0.69	0.75
Fantl et al.	90	0.65	0.38	—	—
Total	5192	0.82	0.57		

* Clinical history plus home pad test.

From Colli E et al. Are Urodynamic Tests Useful Tools for the Initial Conservative Management of Non-Neurogenic Urinary Incontinence? A review of the literature. *Eur Urol* 2003; Jan 43(1):63–9. By permission from S. Karger AG Medical and Scientific Publishers.

TABLE 5. The Role of Patient History in the Diagnosis of Detrusor Overactivity

Authors	Number of Patients	Sensitivity	Specificity	Predictive Value	
				Positive	Negative
Awad and McGinnis	108	0.96	0.25	0.82	0.67
Bent et al.	81	0.83	0.49	0.32	0.91
Cantor and Bates	214	0.91	0.45	0.80	0.79
De Muylder et al.	408	0.62	0.47	0.62	0.48
Glezeman et al.	128	0.40	0.86	0.27	0.92
Hilton and Stanton	100	0.77	0.38	0.44	0.72
Jarvis et al.	100	0.91	0.45	0.54	0.87
Korda et al.	537	0.47	0.63	0.44	0.66
Largo-Janssen et al.	103	0.84	0.77	0.67	0.90
Ouslander et al.	135	0.89	0.21	0.49	0.68
Phua et al.	84	0.84	0.31	0.82	0.84
Sand et al.	218	0.78	0.39	0.80	0.78
Summitt et al.	79	0.46	0.76	0.57	0.46
Thiede and Saini	196	0.88	0.39	0.86	0.88
Valente	102	0.74	0.97	0.88	0.74
Walters and Shields	106	0.35	0.91	0.67	0.35
Sandvik et al.	40	0.56	0.96	—	—
Cundiff et al.	102	0.71	0.87	0.41	—
Haeusler et al.	130	0.62	0.56	0.64	0.39
Fantl et al.	17	—	0.64	0.57	—
Total	2988	0.69	0.60		

From Colli E et al. Are Urodynamic Tests Useful Tools for the Initial Conservative Management of Non-Neurogenic Urinary Incontinence? A review of the literature. *Eur Urol* 2003; Jan 43(1): 63–9. By permission from S. Karger AG Medical and Scientific Publishers.

tence). Post-void dribbling may be present with urethral diverticula. Difficulty starting a urinary stream in the presence of urgency could indicate urethral obstruction from severe pelvic organ prolapse. Chronic pelvic or suprapubic pain aggravated with urination and associated with severe urgency can be seen in women with interstitial cystitis.

The length of time that symptoms have been present is important. *E. coli* and other bladder pathogens secrete toxins that irritate the bladder, which cause rapid onset, transient detrusor overactivity. Urinary incontinence symptoms of recent (less than 1 month) onset, especially when combined with irritative bladder symptoms, should be investigated for infectious etiology. Patients with overactive bladder symptoms may have been treated for multiple presumed urinary tract infections in the absence of confirmatory cultures. Finally, patients may have had prior evaluation and treatment of these chronic bladder symptoms. Careful

history should be taken regarding the specifics of prior treatment and evaluation so as not to waste time and money on unnecessary duplication.

URINARY DIARIES

A self-recorded urinary diary is a very helpful adjunct in the evaluation of patients with lower urinary tract dysfunction. Diaries can vary from a minimum of 24 hours to 1 week in length. Typically, a 48 to 72 hour interval is chosen, with information recorded throughout. Typical information includes urinary symptoms, the volume and timing of fluid intake, as well as the type of fluids consumed, noting carbonated or caffeinated beverages. See Table 6 for an example of a urinary diary. Measurement devices, such as a “Texas hat,” can be placed into the commode to facilitate measurement of voided volumes. Urgency and stress urinary incon-

TABLE 6. Example of a Urinary Diary

Time	Amount Voided	Activity	Urge Present	Leakage	Symptoms	Fluid Intake Amount/Type
6:45 AM	400 ml	Awakening				
7:00 AM		Turning on water	Yes	No		
7:30 AM						6 oz juice
9:00 AM		Sneeze		Yes		
10:00 AM						7 oz water
10:15 AM		Gardening	Yes	No		

tinence episodes and any precipitating activity are recorded. Measurement of nighttime urinary output may be helpful in understanding the causes of nocturia. Polyuria can indicate possible diabetes mellitus or excessive fluid intake (diabetes insipidus). Frequent small voids may be found in women with interstitial cystitis or obstruction and partial urinary retention due to prolapse.

QUESTIONNAIRES

There are multiple self-administered written questionnaires asking about symptoms of urinary incontinence, overactive bladder, pelvic organ prolapse, and fecal incontinence that can be completed by the patient. Many of these questionnaires are lengthy and only emphasize one aspect of female pelvic floor disorders. Shortened versions have been more recently developed and validated for use as screening tools. These questionnaires are generally used by referral cen-

ters and in research protocols. However, with less time available for each physician-patient encounter and frequent patient reluctance to mention these highly personal symptoms, such questionnaires may be useful in the primary care setting. Table 7 lists some of these questionnaires with the published references.¹¹⁻¹³

Physical Examination

GENERAL EXAMINATION

A complete physical examination is indicated, especially before surgical therapy. Lower extremity edema may be mobilized at night while in the recumbent position and contribute to nocturia. Abdominal masses including fibroids or large ovarian cysts may press on the bladder and reduce functional bladder capacity with resultant frequency and urgency symptoms. Costovertebral

TABLE 7. Validated Questionnaires for Symptom Assessment

Questionnaire	Symptoms Evaluated	Goal of Questionnaire	Num of Items	Reference
UDI (Urogenital Distress Inventory)	Urinary incontinence	Symptom distress	28	11
IIQ (Incontinence Impact Questionnaire)	Urinary incontinence	Life impact	31	11
PFDI (Pelvic Floor Distress Inventory)	Urinary incontinence, pelvic organ prolapse, colorectal dysfunction	Symptom distress	46	12
PFIQ (Pelvic Floor Impact Questionnaire)	Urinary incontinence, pelvic organ prolapse, colorectal dysfunction	Life impact	93	12
PISQ (Pelvic Organ Prolapse/Urinary Incontinence Sexual Function Questionnaire)	Urinary incontinence, pelvic organ prolapse	Sexual function	31	13

angle or suprapubic tenderness may indicate an infectious etiology or urinary tract stone. Severe arthritis or other handicap may limit mobility and contribute to functional incontinence.

NEUROLOGIC EXAMINATION

Neurologic examination including testing lower extremity reflexes should be performed. Pelvic neurologic examination is best done at the beginning of the pelvic examination before the patient becomes “desensitized” to being touched in the pelvic region. The bulbocavernosus reflex is elicited by stroking the labium majus or gently tapping on the clitoris. Immediately after stimulation, the bulbocavernosus muscles contract. If contraction cannot be visually confirmed, it can often be palpated with a finger just inside the vaginal hymen. Stimulation of the perineal skin elicits contraction of the anal sphincter (“anal wink”). These reflexes should be checked bilaterally. A normal response indicates an intact sensory and motor reflex arc for the second, third, and fourth sacral nerve roots that innervate the bladder and pelvis. However, the absence of these reflexes does not always indicate a neurologic impairment.

PELVIC EXAMINATION

The vulva and perineum should be inspected for generalized erythema and inflammation (“diaper rash”) resulting from chronic urine contact with the perineal skin. Speculum examination of the vagina should include inspection for atrophy. The urethra and bladder are formed from the same estrogen receptor containing embryonic tissues (urogenital sinus) and would, therefore, also be atrophic. Bimanual examination should be performed to evaluate the uterus and adnexa. Suprapubic tenderness should be noted. The anterior vaginal wall should be palpated under the urethra. Masses or tender nodularity may indicate urethral diverticula, especially if pus is extruded from the urethral meatus during palpation.

Rectal examination should be performed.

Anal incontinence (gas, liquid stool, or solid stool) occurs in up to 20% of patients with urinary incontinence.¹⁴ The tone and integrity of the anal sphincter should be noted. When the anal sphincter is intact, its attachments to the mucosa of the anal verge produce radial creases in the anal skin. Anterior separation of the external anal sphincter may be suggested by the “dovetail” sign, when the pattern of skin creases is absent. Rectovaginal examination during Valsalva may help to differentiate enterocele from rectocele. The bivalve speculum can be disarticulated and the posterior blade easily used during prolapse evaluation. A Sims speculum can also be used.

PELVIC ORGAN PROLAPSE QUANTIFICATION (POP-Q)

The Pelvic Organ Prolapse Quantification (POP-Q) system was adopted by the American Urogynecologic Society and the Society of Gynecologic Surgeons in 1996.¹⁵ It is more reproducible and specific than the Baden halfway scoring system. Prolapse of the anterior, posterior, and apical vagina or cervix is measured in centimeters at its maximal extent relative to the hymen. Measuring devices can include a clear plastic ruler, a ring forceps etched in centimeters, or a proctoscopy swab stick marked in centimeters. Maximal descent is measured above or below the hymen, with the hymen serving as the reference point at zero centimeters. Negative centimeter values are assigned to measurements above the hymen, and positive centimeter values when below the hymen. Up to six points are measured to describe prolapse. The anterior vagina is described by point Aa (measured three centimeters from the external urethral meatus, representing the urethrovesical crease and the approximate location of the bladder neck) and point Ba (which represents the point of greatest descent of the anterior vagina). Similarly, the posterior vagina is described by point Ap (measured three centimeters from the posterior fourchette) and point Bp (which represents the point of

greatest descent of the posterior vagina). The cervix (if present) is point C and the cul-de-sac (if a cervix is present) is point D. In patients who have had a hysterectomy, the vaginal cuff is designated point C and point D is not measured.

If prolapse demonstrated in the recumbent position is less than that described by the patient, or less than her symptoms would suggest, she should be evaluated for maximum prolapse in the standing position. Evaluation of prolapse in the standing position is facilitated by keeping digital contact with the cervix or vaginal bulge with descent into the vagina on straining.

The remaining three points of the POP-Q system are measured with the patient at rest. Total vaginal length (TVL) is measured from the hymen to the vaginal apex. The genital hiatus (GH) is the distance between the middle of the external urethral meatus and the posterior fourchette. Finally, the perineal body is the distance from the posterior fourchette (the top of the perineal body)

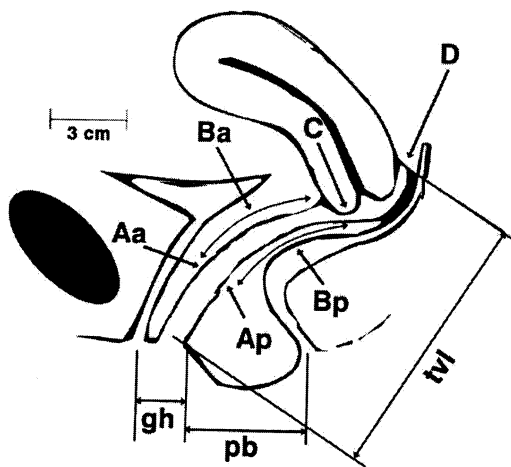


FIGURE 1. Six sites (points *Aa*, *Ba*, *C*, *D*, *Bp*, and *Ap*), genital hiatus (*gh*), perineal body (*pb*), and total vaginal length (*tvL*) used for pelvic organ support quantitation. (From Bump RC, et al. The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. *Am J Obstet Gynecol* 1996; 175:10–17.) By permission from Elsevier Science.

anterior wall Aa	anterior wall Ba	cervix or cuff C
genital hiatus gh	perineal body pb	total vaginal length tvL
posterior wall Ap	posterior wall Bp	posterior fornix D

FIGURE 2. Three-by-three grid for recording quantitative description of pelvic organ support. (From Bump RC, et al. The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. *Am J Obstet Gynecol* 1996; 175:10–17.) By permission from Elsevier Science.

to the mid-anus. Figures 1 and 2 show the POP-Q diagram and measurement-recording scheme in detail. The POP-Q system does not attempt to describe the contents of the prolapse so the term anterior vaginal prolapse is preferred instead of cystocele, posterior vaginal prolapse instead of rectocele, and apical prolapse (which can occur with or without an enterocele).

Paravaginal support, although not measured as part of the POP-Q staging system, should be assessed. Proctoscopy swabs or an opened ring forceps can be used to elevate the lateral anterior vaginal sulci and assess the effect on anterior vaginal prolapse. Asymmetric anterior vaginal prolapse and presence of normal mucosal rugation suggests a paravaginal defect. Symmetrical and non-rugated anterior vaginal prolapse, however, does not rule out the possibility of bilateral paravaginal defects. Published studies have shown poor correlation between preoperative prediction and intraoperative finding of paravaginal defects.¹⁶ Perineal descent is also not measured by the POP-Q

system and should be noted during straining. Perineal descent may indicate detachment of the rectovaginal septum from the perineal body. Vaginal scars from prior colporrhaphies should be noted and correlated with patient history.

ASSESSMENT OF PELVIC MUSCLE FUNCTION

The ability of the patient to contract her pelvic floor muscles (Kegel squeeze) should be evaluated. Ability to perform a quick squeeze (1 second) and a prolonged squeeze (more than 3 seconds) should be noted. Absence of this squeeze may indicate severe neuropathy or severe pubococcygeal muscle atrophy.

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