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Urinary Incontinence in Women

Numerous techniques have been developed to evaluate the types and extent of urinary incontinence. A number of treatment options exist, including behavioral, medical, and surgical approaches. The purpose of this document is to consider the best available evidence for evaluating and treating urinary incontinence in women.

This Practice Bulletin was developed by the ACOG Committee on Practice Bulletins—Gynecology with the assistance of Mark D. Walters, MD. The information is designed to aid practitioners in making decisions about appropriate obstetric and gynecologic care. These guidelines should not be construed as dictating an exclusive course of treatment or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to the institution or type of practice.

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Background

Etiology

Urinary incontinence affects 10–70% of women living in a community setting and up to 50% of nursing home residents (1). Prevalence of incontinence appears to increase gradually during young adult life, has a broad peak around middle age, and then steadily increases in the elderly (2). Most women with incontinence do not seek medical help (3). The estimated annual direct cost of urinary incontinence in women in the United States is $12.43 billion (4).

Among women experiencing urinary incontinence, the differential diagnosis includes genitourinary and nongenitourinary conditions (see box, "Differential Diagnosis of Urinary Incontinence in Women"). Some conditions that cause or contribute to urinary incontinence are potentially reversible (see box, "Common Causes of Transient Urinary Incontinence").

The relative likelihood of each condition causing incontinence varies with the age and health of the individual. Among ambulatory women with incontinence, the most common condition is urodynamic stress incontinence, which represents 29–75% of cases. Detrusor overactivity accounts for 7–33% of incontinence cases, with the remainder being mixed forms (3). Among older, noninstitutionalized women with incontinence evaluated in referral centers, stress incontinence is found less often, and detrusor abnormalities and mixed disorders are more common than in younger ambulatory women. More severe and troublesome incontinence probably occurs with increasing age, especially age older than 70 years (3).

Differential Diagnosis of Urinary Incontinence in Women

Genitourinary etiology

- Filling and storage disorders
  - Urodynamic stress incontinence
  - Detrusor overactivity (idiopathic)
  - Detrusor overactivity (neurogenic)
  - Mixed types
- Fistula
  - Vesical
  - Ureteral
  - Urethral
- Congenital
  - Ectopic ureter
  - Epispadias

Nongenitourinary etiology

- Functional
  - Neurologic
  - Cognitive
  - Psychologic
  - Physical impairment
- Environmental
- Pharmacologic
- Metabolic

Common Causes of Transient Urinary Incontinence

- Urinary tract infection or urethritis
- Atrophic urethritis or vaginitis
- Drug side effects
- Pregnancy
- Increased urine production
  - Metabolic (hyperglycemia, hypercalcemia)
  - Excess fluid intake
  - Volume overload
- Delirium
- Restricted mobility
- Stool impaction
- Psychologic

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Diagnosis

The history and physical examination are the first and most important steps in evaluation. A preliminary diagnosis can be made with simple office and laboratory tests, with initial therapy based on these findings. If complex conditions are present, the patient does not improve after initial therapy, or surgery is being considered, definitive, specialized studies may be necessary.

History and Voiding Diary

In addition to patient history, daily urinary diaries are considered a practical and reliable method of obtaining information on voiding behavior because patient recall by history taking may be unreliable (5). Urinary diaries of diurnal voiding frequency, nocturnal voiding frequency, and number of incontinence episodes have been shown to be highly reproducible and correlated well with urodynamic diagnosis (6). Most authors recommend documentation of symptoms for a 3- to 7-day period (6–8). Consistent results have been shown between the first 3-day period and the last 4-day period, suggesting that a 3-day chart may be adequate to document symptoms, thus improving compliance (8).

After the urologic history, thorough medical, surgical, gynecologic, neurologic, and obstetric histories should be obtained. Certain medical and neurologic conditions, such as diabetes, stroke, and lumbar disk disease, may cause urinary incontinence. Furthermore, strong coughing associated with smoking or chronic pulmonary disease can markedly worsen symptoms of stress incontinence. A bowel history is important because anal incontinence and constipation are relatively more common in women with urinary incontinence and pelvic organ prolapse. A history of hysterectomy, vaginal repair, pelvic radiotherapy, or retropubic surgery should alert the physician to possible effects of prior surgery on the lower urinary tract.

A complete list of the patient's medications (including nonprescription medications) should be obtained. This is important to determine whether individual drugs may be influencing the function of the bladder or urethra, leading to urinary incontinence or voiding difficulties (Table 1).

Physical Examination

General, gynecologic, and lower neurologic examinations are needed on every woman with incontinence. Palpation of the anterior vaginal wall and urethra may elicit urethral discharge or tenderness that suggests a urethral diverticulum or other inflammatory or neoplastic conditions of the urethra. Vaginal discharge can mimic incontinence. The pelvic examination is of primary importance to assess vulvar and vaginal atrophy in menopausal women.

Table 1. Medications That Can Affect Lower Urinary Tract Function

Type of Medication	Lower Urinary Tract Effects
Diuretics	Polyuria, frequency, urgency
Caffeine	Frequency, urgency
Alcohol	Sedation, impaired mobility, diuresis
Narcotic analgesics	Urinary retention, fecal impaction, sedation, delirium
Anticholinergic agents	Urinary retention, voiding difficulty
Antihistamines	Anticholinergic actions, sedation
Psychotropic agents	
Antidepressants	Anticholinergic actions, sedation
Antipsychotics	Anticholinergic actions, sedation
Sedatives and hypnotics	Sedation, muscle relaxation, confusion
Alpha-adrenergic blockers	Stress incontinence
Alpha-adrenergic agonists	Urinary retention, voiding difficulty
Calcium-channel blockers	Urinary retention, voiding difficulty

Modified from Parsons M, Cardozo L. Female urinary incontinence in practice. London: The Royal Society of Medicine Press; 2004. p. 36. http://www.rsmpress.co.uk/bkparsons.htm.

The presence and severity of anterior vaginal relaxation, including cystocele and proximal urethral detachment and mobility, or anterior vaginal scarring, are important to estimate. Associated pelvic support abnormalities, such as posterior vaginal prolapse (rectocele or enterocele) and uterovaginal or apical prolapse, also should be noted. The amount or severity of prolapse in each vaginal segment may be measured and recorded using a method such as the Pelvic Organ Prolapse Quantification System (9). A bimanual examination is useful to rule out coexistent gynecologic pathology, and the anal sphincter should be examined for evidence of prior lacerations or weakness. A rectal examination is useful to further evaluate pelvic and anorectal pathology and fecal impaction, the latter of which may be associated with voiding difficulties and incontinence in older women. Urinary incontinence has been shown to improve or resolve after the removal of fecal impactions in institutionalized geriatric patients (10).

Urinary incontinence may be the presenting symptom of neurologic disease. The screening neurologic examination should include mental status as well as sensory and motor function of the perineum and both lower extremities. Sacral segments 2 through 4 contain the important neurons controlling micturition. The strength and tone of the bulbocavernosus muscle, levators, and external anal sphincter can be estimated digitally. Lower extremity motor function and sensory function along the sacral dermatomes are important to evaluate. The anal reflex and the bulbocavernosus reflex can be used to assess sacral reflex activity. However, these reflexes can be difficult to evaluate clinically (11).

Measuring Urethral Mobility

Predicting the amount of urethral mobility by examination of the anterior vaginal wall is inaccurate. It is difficult to differentiate between cystocele and rotational descent of the urethra with physical examination, and the two often coexist. Placement of a cotton swab in the urethra to the level of the vesical neck and measurement of the axis change with straining (ie, Q-tip test) may be used to demonstrate urethral mobility. Measuring urethral mobility aids in the diagnosis of stress incontinence and in planning treatment for this condition (eg, bladder neck suspension versus periurethral injection of bulking agents).

Because most women with primary urodynamic stress incontinence have urethral hypermobility, a nonmobile urethra should prompt consideration of urodynamic testing. The measurement of urethral mobility is not useful in differentiating urodynamic stress incontinence from abnormalities of voiding or detrusor function because these diagnoses require the measurement of detrusor pressure during filling and emptying. Other tests, such as perineal ultrasonography and magnetic resonance imaging, can be used for assessment of bladder neck mobility, but these are not commonly used in clinical practice.

Laboratory Tests

Few laboratory tests are necessary for the evaluation of incontinence. A clean midstream or catheterized urine sample should be obtained for dipstick urinalysis. If significant bacteriuria is found, antibiotics are appropriate, and the patient can be reevaluated in several weeks.

Blood testing (blood urea nitrogen, creatinine, glucose, and calcium) is recommended if compromised renal function is suspected or if polyuria (in the absence of diuretics) is present. Urine cytology is not recommended in the routine evaluation of the patient with incontinence (12, 13). However, patients with microscopic hematuria (two to five red blood cells per high-power field), those older than 50 years with persistent hematuria (14), or those with acute onset of irritative voiding symptoms in the absence of urinary tract infection may require cystoscopy and cytology to exclude bladder neoplasm.

Office Evaluation of Bladder Filling and Voiding

During office assessment, the specific circumstances leading to the involuntary loss of urine should be determined. If possible, such circumstances should be repro-

duced and directly observed during clinical evaluation. The amount of urine and the time required can be evaluated by normal voiding in the office setting, and the volume of residual urine can then be noted by transurethral catheterization or ultrasound examination of the bladder. A sterile urine sample can be obtained at this time if necessary. A syringe without its piston or bulb can be used to fill the bladder with sterile water to assess bladder capacity. Once the catheter is removed, a cough stress test can be performed to evaluate stress incontinence.

Urodynamic Tests

Cystometry is a test of detrusor function and can be used to assess bladder sensation, capacity, and compliance and to determine the presence and magnitude of both voluntary and involuntary detrusor contractions. Cystometry can be simple and office based or it can be multichannel, including measurement of intraabdominal, bladder, and detrusor (bladder minus intraabdominal) pressures.

Urodynamic tests also are valuable for the assessment of voiding function. Uroflowmetry is an electronic measure of urine flow rate and pattern. Combined with assessment of postvoid residual urine volume, it is a screening test for voiding dysfunction. If the uroflowmetry and postvoid residual urine volume are normal, voiding function is probably normal; however, if the uroflowmetry or postvoid residual urine volume or both are abnormal, further testing is necessary to determine the cause. More sophisticated measures of voiding function include a pressure-flow voiding study with or without videofluoroscopy. Electromyography of the striated urethral sphincter may be useful to assess neurogenic voiding dysfunction.

Normal values for postvoid residual urine volume measurements have not been established. Volumes less than 50 mL indicate adequate bladder emptying, and volumes greater than 200 mL can be considered inadequate emptying. Clinical judgment must be exercised in interpreting the significance of postvoid residual urine volumes, especially in the intermediate range of 50–200 mL. Because isolated instances of elevated residual urine volume may not be significant, the test should be repeated when abnormally high values are obtained.

Cystourethroscopy

Cystourethroscopy may help to identify bladder lesions and foreign bodies, as well as urethral diverticula, fistulas, urethral strictures, and intrinsic sphincter deficiency. It frequently is used as part of the surgical procedures to treat incontinence and is an important component of the evaluation of postoperative incontinence and other intraoperative and postoperative lower urinary tract complications.

Management Options

Absorbent products are the most common method used to actively manage urinary incontinence among community residents (3). Many individuals with mild symptoms or with incontinence that cannot be cured depend on barrier management.

Behavioral Approaches

For women who desire treatment, several behavior modifications can be incorporated, including lifestyle interventions, scheduled or prompted voiding, bladder training, and pelvic muscle rehabilitation. Lifestyle interventions that may help modify incontinence include weight loss, caffeine reduction and fluid management, reduction of physical forces (eg, work, exercise), cessation of smoking, and relief of constipation (1). Other lifestyle alterations are not well supported by published literature.

Bladder training is widely used with no reported side effects and does not limit future treatment options. Also known as bladder drills or timed voiding, it generally is used for the treatment of urge incontinence, but it also may improve symptoms of mixed and stress incontinence. This method aims to increase the time interval between voiding, by either a mandatory or self-adjusted schedule. It is most effective for patients who are physically and cognitively able and who are motivated. Bladder training generally is improved with patient education, the use of scheduled voiding, and positive reinforcement by trained health care professionals (15).

Pelvic muscle exercises, also called Kegel and pelvic floor exercises, are performed to strengthen the voluntary periurethral and perivaginal muscles (voluntary urethral sphincter and levator ani). Pelvic muscle exercises may be used alone or augmented with bladder training, biofeedback, or electrical stimulation. Health care providers can teach patients the correct method of distinguishing and contracting the pelvic muscles.

Medical Management

The urethra and bladder contain a rich supply of estrogen receptors; therefore, it is biologically feasible that estrogen therapy affects postmenopausal urogenital symptoms. However, trials have demonstrated an increase in urinary incontinence with estrogen therapy.

A number of other pharmacologic agents appear to be effective for frequency, urgency, and urge incontinence. However, the response to treatment often is unpredictable, and side effects are common with effective doses. Generally, drugs improve detrusor overactivity by inhibiting the contractile activity of the bladder. These agents can be broadly classified into anticholinergic agents, tricyclic antidepressants, musculotropic drugs, and a variety of less commonly used drugs.

Surgical Treatments

Many surgical treatments have been developed for stress urinary incontinence, but only a few—retropubic colposuspension and sling procedures—have survived and evolved with enough supporting evidence to make recommendations. Contemporary, less invasive modifications of these operations are being performed, and studies assessing their efficacy are ongoing.

Procedures. The basic goal of retropubic colposuspension is to suspend and stabilize the anterior vaginal wall, and, thus, the bladder neck and proximal urethra, in a retropubic position. This prevents their descent and allows for urethral compression against a stable suburethral layer.

Most recent studies are performed with colposuspension techniques using two or three nonabsorbable sutures on each side of the mid urethra and bladder neck. One randomized trial of patients undergoing laparoscopic Burch procedures for stress incontinence showed that two sutures on each side of the urethra resulted in a significantly higher cure rate than one suture (16).

The tension-free vaginal tape procedure is based on a theory that the pathophysiology of stress urinary incontinence is the impairment of the pubourethral ligaments (17). A narrow strip of polypropylene mesh is placed at the mid urethra to compensate for this inefficiency. The success of tension-free vaginal tape has led to the introduction of similar products with modified methods of mid-urethral sling placement (retropubic "top-down" and transobturator). The use of these other materials and modified methods compared with tension-free vaginal tape has yet to be fully evaluated.

A number of bulking agents have been used for the treatment of urodynamic stress incontinence with intrinsic sphincter deficiency in women. The bulking agents (collagen, carbon-coated beads, and fat) are injected transurethrally or periurethrally in the periurethral tissue around the bladder neck and proximal urethra. They provide a "washer" effect around the proximal urethra and the bladder neck. These agents usually are used as second-line therapy after surgery has failed, when stress incontinence persists with a nonmobile bladder neck, or among older, debilitated women for whom any form of operative treatment may be especially hazardous.

Complications. Intraoperative or immediate postoperative complications of surgery for stress incontinence include direct surgical injury to the lower urinary tract, hemorrhage, bowel injury, wound complications, retention, and urinary tract infection. Gynecologic surgeons may perform cystoscopy during or after retropubic and sling procedures to verify ureteral patency and the absence of sutures or sling material in the bladder. Most of the chronic complications after Burch colposuspension and sling procedures relate to voiding dysfunction and urge symptoms (Table 2).

Incontinence With Pelvic Organ Prolapse. Urinary incontinence frequently coexists with uterine prolapse and descent of the anterior vaginal wall. Symptoms of stress incontinence can be overt, or the patient can be asymptomatic but will develop stress incontinence if the vaginal prolapse is reduced or repaired (potential stress incontinence).

Table 2. Complication Rates Following Surgical Treatment for Stress Urinary Incontinence

Complication	Rate	Procedure
Bladder perforation	3–9%	Tension-free tape[1, 2]
	2%	Colposuspension[1]
Detrusor overactivity/ urge incontinence	5–27%	Burch colposuspension[3]
	0–30%	Sling[4, 5]
	6%	Tension-free tape[6]
Erosion of surgical materials	≤5%	Sling[5]
Sling revision or removal	5–35%	Sling[7]
Voiding disorders	2–37%	Sling[8]
	4–11%	Tension-free tape[1, 2, 9]

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[2]Tamussino KF, Hanzal E, Kolle D, Ralph G, Riss PA. Tension-free vaginal tape operation: results of the Austrian registry. Austrian Urogynecology Working Group. Obstet Gynecol 2001;98:732–6.

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[4]Bezerra CA, Bruschini H, Cody DJ. Suburethral sling operations for urinary incontinence in women. The Cochrane Database of Systematic Reviews 2001, Issue 3. Art. No.: CD001754. DOI: 10.1002/14651858.CD001754.

[5]Bidmead J, Cardozo L. Sling techniques in the treatment of genuine stress incontinence. BJOG 2000;107:147–56.

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[7]Persson J, Iosif C, Wolner-Hanssen P. Risk factors for rejection of synthetic suburethral slings for stress urinary incontinence: a case-control study. Obstet Gynecol 2002;99:629–34.

[8]Jarvis GJ. Surgery for genuine stress incontinence. Br J Obstet Gynaecol 1994; 101:371–4.

[9]Klutke C, Siegel S, Carlin B, Paszkiewicz E, Kirkemo A, Klutke J. Urinary retention after tension-free vaginal tape procedure: incidence and treatment. Urology 2001;58:697–701.

Clinical Considerations and Recommendations

▶ *When is office evaluation of bladder filling, voiding, or cystometry useful for evaluation of incontinence?*

The findings of a careful history and physical examination predict the actual incontinence diagnosis with reasonable accuracy. Whenever objective clinical findings do not correlate with or reproduce the patient's symptoms, simple bladder filling and cough stress tests are useful. When trials of therapy are used, patients must be monitored periodically to evaluate response. If the patient fails to improve to her satisfaction, appropriate further testing is indicated. Of women who have the symptom of stress incontinence as their only symptom, 10–30% are found to have bladder overactivity (alone or coexistent with urodynamic stress incontinence) or other rare conditions.

Retrograde bladder filling provides an assessment of bladder sensation and an estimate of bladder capacity. Patients without urgency and frequency who note a sensation of bladder fullness and have an estimated bladder capacity that is within normal range probably have normal bladder filling function. The definition of normal bladder capacity lacks consensus, with values that range from 300 mL to 750 mL. In addition, large bladder capacities are not always pathologic. Researchers showed that 33% of women with bladder capacities greater than 800 mL were urodynamically normal, and only 13% had true bladder atony (18).

Loss of small amounts of urine in spurts, simultaneous with coughing and in the absence of urge, strongly suggests a diagnosis of urodynamic stress incontinence (19, 20). Prolonged loss of urine, leaking 5–10 seconds after coughing, or no urine loss with provocation indicates that other causes of incontinence, especially detrusor overactivity, may be present. The inability to demonstrate the sign of stress incontinence during simple bladder filling and cough stress test correlates highly with the absence of urodynamic stress incontinence (20, 21). Interpretation of these office tests can be difficult because of artifact introduced by increases in intraabdominal pressure caused by straining or patient movement. Borderline or negative test results should be repeated to maximize their diagnostic accuracy.

Limited data support the need for cystometric testing in the routine or basic evaluation of urinary incontinence. It is indicated as part of the evaluation of more complex disorders of bladder filling and voiding, such as the presence of neurologic disease and other comorbid conditions.

Multichannel or subtracted cystometry allows more precise measurements of detrusor pressures with filling and voiding, although both false-positive and false-negative test results generally are found with cystometry. No studies have determined whether the addition of multichannel cystometry or video assessment over simple filling cystometry improves diagnostic accuracy or outcomes after treatment. Other complex urodynamic tests, such as a pressure-flow voiding study, uroflowmetry, and electromyography of the urethral sphincter, are available for the assessment of complex and neurogenic causes of urinary incontinence and voiding disorders.

Even under the most typical clinical situations, the diagnosis of incontinence based only on clinical evaluation may be uncertain. This diagnostic uncertainty may be acceptable if medical or behavioral treatment (as opposed to surgery) is planned because of the low morbidity and cost of these treatments and because the ramifications of continued incontinence are not severe. When surgical treatment of stress incontinence is planned, urodynamic testing often is recommended to confirm the diagnosis, unless the patient has an uncomplicated history and compatible physical findings of stress incontinence and has not had previous surgery for incontinence.

▶ *When are urethral pressure profilometry and leak point pressure measurements useful for evaluation of incontinence?*

Based on extensive review of the evidence, researchers found that urethral pressure profilometry is not standardized, reproducible, or able to contribute to the differential diagnosis in women with stress incontinence symptoms (22). Therefore, it does not meet the criteria for a useful diagnostic test (22). Leak point pressure measures the amount of increase in intraabdominal pressure that causes stress incontinence, although its usefulness also has not been proved (23).

▶ *When is cystoscopy useful for evaluation of incontinence?*

Cystoscopy is indicated for the evaluation of patients with incontinence who have sterile hematuria or pyuria; irritative voiding symptoms, such as frequency, urgency, and urge incontinence, in the absence of any reversible causes; bladder pain; recurrent cystitis; suburethral mass; and when urodynamic testing fails to duplicate symptoms of urinary incontinence (24). Bladder lesions are found in less than 2% of patients with incontinence (25, 26); therefore, cystoscopy should not be performed routinely in patients with incontinence to exclude neoplasm.

Are pessaries and medical devices effective for the treatment of urinary incontinence?

Pessaries and other mechanical devices modified to selectively support the bladder neck may be effective for treating some cases of urinary incontinence, but objective evidence regarding their effectiveness has not been reported (1). Replacement of the prolapsed anterior vaginal wall with a pessary may unmask incontinence by straightening out the urethrovesical kinking that may have been responsible for either continence or some degree of urinary retention.

Are behavior modifications (eg, bladder retraining, biofeedback, weight loss) effective for the treatment of urinary incontinence?

In one study, behavioral therapy that included group and individual instruction, individualized scheduled voiding, diary keeping, and instructions on pelvic muscle exercises resulted in a 50% reduction in the mean number of incontinence episodes (compared with a 15% reduction in controls; $P = .001$), and this was maintained for 6 months (27). Thirty-one percent of women were 100% improved (dry), 41% were at least 75% improved, and 52% were at least 50% improved. There were no differences in treatment efficacy by type of incontinence (stress, urge, mixed) (27). Data show that behavioral training with biofeedback resulted in a 63% mean reduction in incontinence episodes, compared with a 69% mean reduction following verbal feedback and a 59% mean reduction after receiving a self-help booklet (differences not significant) (28). Patient satisfaction was highest in the verbal feedback group and lowest in the self-help booklet group. For stress incontinence, behavioral training reduced the mean number of incontinence episodes by 69%; the addition of pelvic floor electrical stimulation did not result in significantly greater improvement than behavioral training alone (29). Therefore, behavioral therapy improves symptoms of urge and mixed incontinence and can be recommended as a noninvasive treatment in many women.

Researchers showed that combining drug and behavioral therapy in a stepped program can produce added benefit for patients with urge incontinence (30). However, there is not enough evidence to show whether drug therapy is better than bladder training or useful as a supplement (31).

Obesity appears to be an independent risk factor for the development of incontinence, with obese women having a 4.2-fold greater risk of stress urinary incontinence than those with a normal body mass index (32–35). Few published intervention studies have investigated incontinence after weight loss, and these addressed only the effects of massive weight loss in morbidly obese women (36, 37).

Are pelvic muscle exercises effective for the treatment of urinary incontinence?

Pelvic floor training appears to be an effective treatment for adult women with stress and mixed incontinence (38), and pelvic muscle exercises appear better than no treatment or placebo. Pelvic muscle exercise reduces incontinence and increases vaginal pressure measurements, but direct correlations between these alterations are weak (39). Pelvic muscle exercise appears to be superior to electrical stimulation and vaginal cones in the treatment of stress incontinence (40). Bladder training, pelvic muscle exercise, or their combination appeared equal in symptom improvement and urodynamic parameters in one randomized trial (41). Generally, the effect of adding pelvic muscle training to other treatments for stress urinary incontinence and the effects of pelvic muscle exercise on urge incontinence alone remain unclear (38).

Is pharmacotherapy (eg, estrogen, tolterodine, oxybutynin, imipramine) effective for the treatment of urinary incontinence?

The effect of postmenopausal hormone therapy (HT) on urinary incontinence has been evaluated in several randomized controlled trials. One trial studied postmenopausal women with at least one episode of incontinence weekly at baseline, randomized to receive either HT or placebo (42). Exacerbation of incontinence occurred in 39% of the HT group and 27% of the placebo group ($P = .001$). In a subset analysis of the Women's Health Initiative study, postmenopausal women both with and without symptoms of incontinence were randomized to receive a) combined HT or placebo or b) unopposed estrogen therapy or placebo (43). Both combined therapy and unopposed estrogen were found to increase the incidence of urinary incontinence among women without symptoms at baseline. For those women with symptoms at baseline, frequency increased in both the combined therapy and unopposed estrogen groups.

Other smaller studies have examined the use of oral estrogen preparations in the treatment of stress or urge incontinence and found that the use of estrogen did not reduce incontinence (44–47). Therefore, oral estrogen regimens cannot be recommended as treatment or prevention for any type of urinary incontinence.

Several meta-analyses addressing drug therapy for bladder overactivity have been published (48, 49). The

anticholinergic drugs oxybutynin chloride and tolterodine have five or more randomized controlled trials each; these trials report a small beneficial effect of anticholinergic drug treatment as therapy for urge incontinence (48). However, for many of the outcomes studied, the observed differences between treatment with anticholinergic medications and placebo may be of questionable clinical significance (49). No significant difference among these agents was reported. The most typical side effect of anticholinergic therapy is dry mouth; other side effects most frequently reported were blurred vision, constipation, nausea, dizziness, and headache (48). Alternative drugs, new drugs, and new formulations of existing drugs are all available, but limited data exist on which to base recommendations.

Is there a role for bulking agents in the treatment of urinary incontinence?

Most of the reported studies have used glutaraldehyde cross-linked collagen as the bulking agent. Reviewers summarized the literature on cross-linked bovine collagen for the treatment of stress incontinence and intrinsic sphincter deficiency (50). Most patients in the studies had failed incontinence surgeries and had a supported nonmobile bladder neck. Seventeen studies were cited with cure rates ranging from 7% to 83% over a 10-year period. The cure rate, defined in 15 articles as completely dry, averaged 48%. An overall average of 76% of subjects (range, 68–90%) were listed as "dry" or "improved" (50). The limitations of existing bulking agents are their durability and long-term results.

For women with extensive comorbidity precluding surgery or anesthesia or both, injection of bulking agents may provide a useful option for relief of symptoms for a 12-month period. Two or three injections are likely to be required to achieve a satisfactory result (51).

When is surgery indicated for urinary incontinence?

Surgery is indicated for the treatment of stress urinary incontinence when conservative treatments have failed to satisfactorily relieve the symptoms and the patient wishes further treatment in an effort to achieve continence. It is desirable if the patient does not wish to have more children, although retaining fertility potential is not a contraindication of surgery. However, there is no evidence on the effect of subsequent pregnancy.

Not all patients with urinary incontinence need urodynamic testing before surgery. These patients include women who lose urine only with physical exertion; have normal voiding habits (<8 voiding episodes per day, <2 per night); have no associated findings on neurologic or physical examination; have no history of antiincontinence or radical pelvic surgery; possess a hypermobile urethra, pliable vaginal wall, and adequate vaginal capacity on physical examination; have a normal postvoid residual volume; and are not pregnant.

Patients who are thought to have detrusor overactivity on clinical evaluation can be given appropriate behavioral or medical therapy, and a substantial percentage of patients can be expected to respond (52). Even patients with mixed disorders (coexistent stress and urge incontinence) respond to various forms of conservative therapy (53, 54).

Which type of surgery is indicated in the treatment of urinary incontinence?

Retropubic colposuspension procedures are indicated for women with the diagnosis of urodynamic stress incontinence and a hypermobile proximal urethra and bladder neck. Selection of a retropubic approach (versus a sling) depends on many factors, such as the need for laparotomy for other pelvic disease, the amount of pelvic organ prolapse and whether a vaginal or abdominal procedure will be used to suspend the vagina, the age and health status of the patient, and the preferences of the patient and surgeon. Although retropubic procedures can be used for intrinsic sphincter deficiency with urethral hypermobility, sling operations may yield better long-term results. Hysterectomy adds little to the efficacy of Burch colposuspension in curing stress incontinence (55), and it should be performed only for specific uterine pathology or for the treatment of uterine prolapse.

One consensus panel review indicated that after 48 months, retropubic suspensions and sling procedures seem to be more efficacious than transvaginal needle suspension procedures or anterior colporrhaphy (56). The authors also noted that retropubic suspensions and sling procedures are associated with slightly higher complication rates, including longer convalescence and postoperative voiding dysfunction. Clinical outcomes of the tension-free vaginal tape procedure and other mid-urethral slings were not available at the time of the consensus panel review.

Several review articles have been published summarizing the cure rates of retropubic procedures compared with other procedures for the treatment of urodynamic stress incontinence. Open abdominal retropubic suspension appears to be better than anterior vaginal repair, even in women with prolapse, judged on subjective cure rates in six trials (57).

A multicenter randomized trial found no difference between Burch colposuspension and tension-free vaginal tape procedures, with objective cure rates for urodynamic

stress incontinence of 57% and 66%, respectively (58). Bladder injury was more common during the tension-free vaginal tape procedure ($P = .013$); delayed voiding, operation time ($P < .001$), and return to normal activity ($P < .001$) were all longer after colposuspension (58).

In a cohort of women who underwent Burch colposuspension, the cure rate of stress incontinence gradually decreased over 10–12 years, reaching a plateau at 69% (59). Cure rates were significantly lower in women who had previous bladder neck surgery ($P = .02$). Approximately 10% of patients required at least one additional surgery to cure their stress incontinence (59).

Only a few studies have assessed the paravaginal defect repair for stress incontinence. A prospective randomized trial found that only 61% of women were continent 3 years after a paravaginal defect repair, compared with 100% of women who were continent 3 years after a Burch colposuspension ($P = .004$) (60). The paravaginal defect repair should not be used as primary treatment of urodynamic stress incontinence.

Laparoscopic access can be used to perform a Burch colposuspension, and this technique has become popular with some physicians and patients. However, it remains to be proved whether laparoscopic colposuspension yields cure rates equal to open Burch colposuspension for stress incontinence in women. One recent randomized trial comparing open Burch colposuspension with laparoscopic colposuspension showed significantly higher objective and subjective stress incontinence cure rates in the open Burch group ($P < .001$) (61); however, the results of most other studies comparing the two techniques are inconclusive (62, 63).

Long-term objective results of the tension-free vaginal tape procedure for primary stress incontinence were shown in a multicenter trial; at a median follow-up of 56 months, 85% of patients were objectively and subjectively cured, 10.6% were improved, and 4.7% were regarded as failures (64). There were no cases of mesh erosion or permanent retention. Two randomized trials comparing the results of tension-free vaginal tape with Burch colposuspension showed similar objective and subjective cure rates from both procedures (58, 65). However, a recent randomized trial of laparoscopic Burch colposuspension and tension-free tape procedures showed higher objective cure rates for urodynamic stress incontinence for tension-free tape procedures, although quality of life and satisfaction scores were similar between procedures (66).

Two large cohort studies have assessed the results of pubovaginal fascial bladder neck sling for stress incontinence. At a mean follow-up of 51 months (range 22–68), continence rates were 88% overall (67). Preoperative urge incontinence resolved in 81 of 109 women (74%), whereas de novo urgency developed in 7% of women. In patient questionnaires, 92% reported a high degree of satisfaction with low symptom distress scores. In another study of 251 women, permanent urinary retention developed in 2% of patients (68).

The intermediate and long-term results for suburethral slings suggest that the 10-year continence rate is similar to the 1-year continence rate (69). In fact, it appears that sling procedures that are effective after 6 months are likely to remain effective for many years (69).

For patients with both prolapse and urinary incontinence, what surgical procedures are appropriate?

Patients with vaginal prolapse with coexistent symptomatic stress incontinence have a number of treatment options. Treatment choice often depends on patient characteristics and the surgeon's experience. If the prolapse is to be repaired abdominally, as with a sacral colpopexy, a retropubic colposuspension may be appropriate. Transvaginal prolapse repair may include a sling placed at the time of repair to treat stress incontinence.

Women who have severe pelvic organ prolapse but potential stress incontinence present a unique challenge. Data supporting specific recommendations in these patients are scarce and several opposing opinions are common. In fact, even the correct method for making the diagnosis of potential stress incontinence is controversial. For women who have significant anterior vaginal wall prolapse after their vaginal apex is suspended, appropriate repair generally is indicated. Suburethral plication of the bladder neck to stabilize a hypermobile urethra is probably appropriate in many cases. One recent randomized controlled trial of women with prolapse and potential stress incontinence showed that a tension-free vaginal tape procedure resulted in less incontinence postoperatively than a suburethral plication ($P = .01$) with similar rates of urinary retention and urge incontinence (70).

Summary of Conclusions and Recommendations

The following recommendations are based on good and consistent scientific evidence (Level A):

- Behavioral therapy, including bladder training and prompted voiding, improves symptoms of urge and mixed incontinence and can be recommended as a noninvasive treatment in many women.

- Pelvic floor training appears to be an effective treatment for adult women with stress and mixed incontinence and can be recommended as a noninvasive treatment for many women.
- Pharmacologic agents, especially oxybutynin and tolterodine, may have a small beneficial effect on improving symptoms of detrusor overactivity in women.

The following recommendations are based on limited or inconsistent scientific evidence (Level B):

- Cystometric testing is not required in the routine or basic evaluation of urinary incontinence.
- Bulking agents are a relatively noninvasive method of treatment for stress incontinence and can be used in women for whom any form of operative treatment is contraindicated.
- Long-term data suggest that Burch colposuspension and sling procedures have similar objective cure rates; therefore, selection of treatment should be based on patient characteristics and the surgeon's experience.
- The combination of a hysterectomy and a Burch colposuspension does not result in higher continence rates than a Burch procedure alone.
- Tension-free vaginal tape and open Burch colposuspension have similar success rates.
- Anterior colporrhaphy, needle urethropexy, and paravaginal defect repair have lower cure rates for stress incontinence than Burch colposuspension.

The following recommendations are based primarily on consensus and expert opinion (Level C):

- After the basic evaluation of urinary incontinence, simple cystometry is appropriate for detecting abnormalities of detrusor compliance and contractibility, measuring postvoid residual volume, and determining capacity.
- Patients with urinary incontinence should undergo a basic evaluation that includes a history, physical examination, measurement of postvoid residual volume, and urinalysis.

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The MEDLINE database, the Cochrane Library, and ACOG's own internal resources and documents were used to conduct a literature search to locate relevant articles published between January 1985 and February 2005. The search was restricted to articles published in the English language. Priority was given to articles reporting results of original research, although review articles and commentaries also were consulted. Abstracts of research presented at symposia and scientific conferences were not considered adequate for inclusion in this document. Guidelines published by organizations or institutions such as the National Institutes of Health and the American College of Obstetricians and Gynecologists were reviewed, and additional studies were located by reviewing bibliographies of identified articles. When reliable research was not available, expert opinions from obstetrician–gynecologists were used.

Studies were reviewed and evaluated for quality according to the method outlined by the U.S. Preventive Services Task Force:

- I Evidence obtained from at least one properly designed randomized controlled trial.
- II-1 Evidence obtained from well-designed controlled trials without randomization.
- II-2 Evidence obtained from well-designed cohort or case–control analytic studies, preferably from more than one center or research group.
- II-3 Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.
- III Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Based on the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:

Level A—Recommendations are based on good and consistent scientific evidence.

Level B—Recommendations are based on limited or inconsistent scientific evidence.

Level C—Recommendations are based primarily on consensus and expert opinion.

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