The Evaluation And Treatment Of Urinary Incontinence In Women: A Primary Care Approach

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Abstract: ***Background:*** **Urinary incontinence, the involuntary loss of urine severe enough to have adverse social or hygienic consequences, is a major clinical problem and a significant cause of disability and dependency. At least 10 million adults in the US suffer from urinary incontinence, including an estimated 15 to 30 percent of community-dwelling older persons. In spite of its high rate of occurrence, fewer than one-half of women with regular urinary incontinence seek medical help for their problem, either because of embarrassment or the perception that their symptoms are normal.**

Methods: **MEDLINE files were searched from 1970 to 1990 using the key words "incontinence," "prevalence," and "diagnosis" and for specific nonsurgical treatments. Only articles pertaining to adult women were chosen.**

Results and Conclusions: **Urinary incontinence frequently can be diagnosed accurately by family physicians using basic tests in the office. Many women experience improvement of incontinence with properly employed behavioral and pharmacologic therapy. Other women benefit from referral for specialized evaluation and consideration for surgical therapy. (J Am Board Fam Pract 1992; 5:289-301.)**

Urinary incontinence is a common problem among women — and one that often goes unaddressed in primary care. Defined as the involuntary loss of urine severe enough to have adverse social or hygienic consequences, urinary incontinence affects at least 10 million US adults at an estimated annual cost of $10.3 billion.[1] While incontinence as such is not life threatening, it affects quality of life by causing psychological distress and social disruption. Urinary incontinence is associated with anxiety, depression, and sexual dysfunction[2-4]; patients suffer embarrassment and often limit their excursions outside the home, their social interactions, and their sexual activities.[5]

The rate of urinary incontinence among women of all ages is high, but estimates of the magnitude of the problem vary widely with different definitions of disease, different populations studied, and different survey methods. Up to one-half of young nulliparous women report occasional leaking with cough, laugh, or sneeze; more frequent symptoms of stress incontinence are found in about 2 percent.[6-8] Twenty percent to 40 percent of middle-aged and community-dwelling elderly women have incontinence[8-11]; the rate is even higher among institutionalized elderly.[12,13]

In spite of its high rate, urinary incontinence is underrecognized and undertreated. Surveys of community-dwelling women suggest that fewer than one-half of women with regular urinary incontinence seek medical help for their problem, either because of embarrassment or the perception that their symptoms are normal.[10,11]

While much literature addresses evaluation and treatment of incontinence by urologists and gynecologists, little guidance is designed specifically for the family physician. In fact, many women experience considerable improvement of incontinence with properly employed nonsurgical therapy — therapy appropriate to primary care. Other women benefit from referral for specialized evaluation and consideration for surgical therapy. Thus, it is important that family physicians detect urinary incontinence and be able to evaluate, treat, and refer patients appropriately.

The purpose of this review is to offer a practical approach to the evaluation and treatment of women with urinary incontinence in the primary care setting. Adequate evaluation of many women

Submitted, revised, 2 January 1992.

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with urinary incontinence can be accomplished in an office setting, using history, physical examination, and a few simple tests. These tools allow the physician to formulate a presumptive diagnosis of the type of incontinence, so that appropriate conservative treatment can be instituted. In addition, conditions that require specialized evaluation can be identified.

Types of Incontinence

Among women complaining of urinary incontinence, the differential diagnosis includes genitourinary and nongenitourinary conditions (Table 1). Genitourinary disorders include problems of bladder filling and storage, as well as extraurethral disorders, such as fistula and congenital abnormalities. Nongenitourinary conditions are those in which function of the lower urinary tract is intact, but other factors, such as immobility or severe cognitive impairment, result in urinary incontinence.[1] In addition, some women who complain of wetness or leaking have other causes for their symptoms; vaginal discharge, for example, can mimic urinary incontinence.[14]

Genuine stress incontinence (GSI) is defined by the International Continence Society as the involuntary loss of urine occurring when, in the absence of a detrusor contraction, the intravesical pressure exceeds the maximum urethral pressure.[15] The mechanism of this condition is incompetence of the bladder neck and urethra, resulting mainly from an abnormal descent and mobility of these structures with increases in intraabdominal pressure or from an intrinsic dysfunction of the urethral sphincteric mechanism.

Table 1. Differential Diagnosis of Urinary Incontinence in Women.

Genitourinary Causes	Nongenitourinary Causes
Filling or storage disorders	Neurologic
Genuine stress incontinence	Cognitive
Detrusor instability (idiopathic)	Functional
Detrusor hyperreflexia (neurogenic)	Mood
	Environment
Mixed types	Pharmacologic
Overflow incontinence	Metabolic
Fistula	
Vesical	
Ureteral	
Urethral	
Congenital	
Ectopic ureter	
Epispadias	

Bladder-filling disorders are usually due to uninhibited, involuntary detrusor contractions. In the absence of a known neurologic abnormality, this detrusor overactivity is called *detrusor instability* (DI). Detrusor overactivity caused by a disturbance of neurologic control is termed *detrusor hyperreflexia*.[15] Mixed incontinence refers to incontinence with features of more than one type — usually GSI and DI.

Overflow incontinence is defined as any involuntary loss of urine associated with overdistention of the bladder.[15] This diagnosis is usually associated with diabetes mellitus or other neurologic diseases. The terms "voiding difficulty" or "voiding dysfunction" refer to problems with emptying the bladder, including urinary retention, urethral obstruction, and poor detrusor function. Voiding difficulty is frequently associated with overflow incontinence.

The relative likelihood of each cause of incontinence varies with the age and health status of the individual. Among ambulatory, adult incontinent women, the most common condition is GSI, which represents 50 to 70 percent of cases.[16-18] DI and mixed forms account for 20 to 40 percent of incontinence cases.[16] Among noninstitutionalized elderly incontinent women evaluated in referral centers, GSI is found less frequently (30 to 46 percent), and detrusor overactivity and mixed disorders are more common, occurring in 29 to 61 percent of cases.[13,19,20] Incontinence in institutionalized elderly women is more likely to be due to detrusor overactivity (38 to 61 percent); GSI is found in only 16 to 21 percent.[21,22]

Evaluation

Urinary incontinence can be a *symptom* of which patients complain, a *sign* demonstrated on examination, or a *condition* (i.e., diagnosis) that can be confirmed by definitive studies. When a woman complains of urinary incontinence, appropriate evaluation includes exploring the nature of her symptoms and looking for physical findings. The history and physical examination are the two most important steps in the evaluation. A preliminary diagnosis can be made with simple office tests and laboratory tests, allowing for therapy to be instituted. When the patient does not improve, when neurologic disease or other complex conditions are present, or when the possibility of surgery is entertained, definitive, specialized studies are necessary.

History

One should elicit a description of the complaint, including its duration and frequency. A clear understanding of the severity of the problem or disability and its effect on quality of life should be sought. Table 2 lists questions that are helpful in evaluating incontinence in women. The first question is designed to elicit the symptom of stress incontinence, i.e., urine loss with events that increase intraabdominal pressure. The symptom of stress incontinence is usually (but not always) associated with the diagnosis of GSI. Questions 2 through 9 help elicit the symptoms that are associated with DI. The symptom of urge incontinence is present if the patient answers question 3 affirmatively. Frequency (questions 4 and 5), bed-wetting (question 6), leaking with intercourse (question 8), and a sense of urgency (questions 2 and 7) are all associated with the condition of DI. Questions 9 and 10 help to define the severity of the problem. Questions 11 through 13 screen for urinary tract infection and neoplasia, and questions 14 through 17 are designed to elicit symptoms of voiding dysfunction.

Table 2. Questions for the Evaluation of Female Urinary Incontinence.

1. Do you leak urine when you cough, sneeze, or laugh?
2. Do you ever have such an uncomfortably strong need to urinate that if you don't reach the toilet you will leak?
3. If "yes" to No. 2, do you ever leak before you reach the toilet?
4. How many times during the day do you urinate?
5. How many times do you void during the night after going to bed?
6. Have you wet the bed in the past year?
7. Do you develop an urgent need to urinate when you are nervous, under stress, or in a hurry?
8. Do you ever leak during or after sexual intercourse?
9. Do you find it necessary to wear a pad because of your leaking?
10. How often do you leak?
11. Have you had bladder, urine, or kidney infections?
12. Are you troubled by pain or discomfort when you urinate?
13. Have you had blood in your urine?
14. Do you find it hard to begin urinating?
15. Do you have a slow urinary stream?
16. Do you have to strain to pass your urine?
17. After you urinate, do you have dribbling or a feeling that your bladder is still full?

Thorough medical, neurological, surgical, gynecologic, and obstetric histories are important. Diabetes, stroke, multiple sclerosis, vitamin B_{12} deficiency, tabes dorsalis, and lumbar disc disease are examples of illnesses that can cause incontinence. Cough can worsen previously mild stress incontinence symptoms. Chronic severe constipation is associated with a number of urinary problems, including voiding difficulties, urgency, stress incontinence, and increased bladder capacity.[23] Prior surgery, such as hysterectomy, vaginal repair, and retropubic surgery, can affect urinary function.

A complete list of the patient's medications will help to reveal whether individual drugs might influence the function of the bladder or urethra, leading to urinary incontinence or voiding difficulties. Types of drugs that commonly affect lower urinary tract function are shown in Table 3. Especially in the elderly, reducing a drug dosage or eliminating an offending drug can resolve urinary problems. Diuretic use can, if not induce incontinence, worsen the condition.[24]

Patient histories regarding the frequency and severity of urinary symptoms are less accurate and reliable than are urinary diaries.[25] Diaries require the patient to record the daily volume and frequency of fluid intake and voiding, as well as episodes of incontinence and associated events, such as cough or urgency. Diaries are usually kept for 1 to 7 days and are useful to corroborate or modify the working diagnosis, especially when symptoms are confusing or uncertain. In addition, review of diaries can detect excessive fluid intake or situations for which scheduled voiding could help control symptoms.

Physical Examination

Every incontinent woman should have a general physical and lower extremity neurologic examina-

Table 3. Medications That Can Affect Lower Urinary Tract Function.

Type of Medication	Lower Urinary Tract Effects
Diuretic	Polyuria, frequency, urgency
Anticholinergic	Urinary retention, overflow incontinence
Psychotropic	
Antidepressant	Anticholinergic actions, sedation
Antipsychotic	Anticholinergic actions, sedation
Sedative-hypnotic	Sedation, muscle relaxation
α-Adrenergic blocker	Stress incontinence
α-Adrenergic agonist	Urinary retention
β-Adrenergic agonist	Urinary retention

tion, and the pelvic examination is of primary importance. Vaginal discharge, because it can mimic incontinence, should be detected and treated. Atrophy of the vulva and vagina implies changes in the urethra, bladder, and periurethral tissues that result from estrogen deficiency. The presence and severity of cystocele, rectocele, enterocele, and uterovaginal prolapse are noted. A bimanual examination is done to rule out coexistent gynecologic disorders, which can occur in up to two-thirds of patients.[26] With the rectal examination the physician further evaluates for pelvic disease and for fecal impaction, the latter of which can be associated with voiding difficulties and incontinence in elderly women.[27] Urinary incontinence has been shown to improve or resolve after the removal of fecal impactions in institutionalized geriatric patients.[28]

Urinary incontinence can be the presenting symptom of early neurologic disease. The physician performs the general and lower extremity neurologic examination to evaluate general cognitive function and sensory and motor functions of sacral segments 2 to 4, which contain the important neurons controlling micturition and to look for signs of a myelopathy (spasticity, hyperreflexia, weakness). To test motor function, the patient extends and flexes the hip, knee, and ankle and inverts and everts the foot. The strength and tone of the external anal sphincter are estimated digitally. The patellar, ankle, and plantar reflex responses are tested. Sensory function along the sacral dermatomes is tested by using light touch and pinprick on the perineum and around the thigh and foot.

Two reflexes can help in the examination of sacral reflex activity. In the anal reflex, stroking the skin adjacent to the anus causes reflex contraction of the external anal sphincter muscle. The bulbocavernous reflex involves contraction of the bulbocavernous and ischiocavernous muscles in response to tapping or squeezing the clitoris. Unfortunately, these reflexes can be difficult to evaluate clinically and are not always present, even in neurologically intact women.[29]

Office Tests

Few laboratory tests are necessary for the evaluation of incontinence. A clean midstream or catheterized urine sample is obtained for urinalysis and culture. Patients with acute cystitis can have various irritative symptoms, such as dysuria, frequency, urgency, incontinence, and voiding difficulty.[30,31] In these cases, treatment of the infection will usually eradicate the symptoms. Bacteriuria can be an incidental finding, however, because it is frequently asymptomatic, especially in the elderly.[32] It seems reasonable to prescribe appropriate antibiotics for bacteriuric incontinent patients and to reevaluate in several weeks. Patients with hematuria or with recurrent or persistent urinary tract infections should undergo appropriate evaluation and urologic consultation. Diabetes should be ruled out in patients with polyuria frequency, nocturia, voiding difficulties, or chronic urinary tract infection. Tests of renal function, urine cytology, and radiographic procedures are necessary only for specific medical and urologic indications.

The office evaluation of incontinence should involve some assessment of voiding, detrusor function during filling, and competency of the urethral sphincteric mechanism. During the assessment, one should try to determine specifically the circumstances leading to the involuntary loss of urine. If possible, such circumstances should be reproduced and directly observed and evaluated. This series of tests is most easily initiated with the patient's bladder comfortably full. In the supine position, direct observation of the external urethral meatus with coughing (stress test) is done. Urine leaking in spurts during or immediately after the cough is the physical finding, or sign, of stress incontinence. If no leaking is observed supine, then the test should be repeated in the standing position. Prolonged loss of urine, leaking 5 to 10 seconds after coughing, or no urine loss with provocation indicates that GSI is unlikely, and other causes of incontinence, usually detrusor instability, might be present. After this stress test, the patient is allowed to void as normally as possible in private, noting the amount of time to void. The urine is collected in a container attached inside the toilet and the voided volume is recorded. The patient then returns to the examination room, and the volume of residual urine is measured. This measurement is most directly and accurately done with "in and out" transurethral catheterization. If a clean urine sample has not yet been obtained for analysis and culture, it can be obtained at this time. Less invasive techniques used to estimate bladder volume include bladder palpation (by bimanual examination) and ultrasonography.[33] Bladder palpation has been reported to be adequate for gross estimation of retained urine in the elderly,[27] but, compared with catheterization, it is relatively insensitive for detecting volumes of residual urine.[34]

These simple office exercises yield much information about lower urinary tract function. The average urine flow rate, calculated by dividing the volume voided by the number of seconds to void, should be more than 10 to 15 mL/sec. Bladder capacity is estimated by noting the sum of the volume voided and residual urine volume. Normal values for bladder capacity range from 300 mL[35] to 750 mL.[36] Postvoiding residual urine volumes should be less than 100 mL.[37,38] Because isolated instances of elevated residual urine volume might not be of significance,[37] the test should be repeated when abnormally high values are obtained.

Making the Diagnosis

The findings of a careful history and physical examination predict the actual incontinence diagnosis with reasonable accuracy. Women who have the symptom of stress incontinence as their only complaint have a 70 to 90 percent chance of having GSI confirmed on diagnostic urodynamic testing.[16-18,20,39-44] Ten percent to 30 percent of such patients will be found to have DI (alone or coexistent with genuine stress incontinence). Sensory urgency, urge incontinence, diurnal and nocturnal frequency, and bed-wetting have all been associated with DI.[17,40,45-47] The more of these abnormal urinary symptoms the patient has, the greater the chance that she has DI.[47] The physical findings of abnormal neurologic examination[20] and cystocele[16] have been associated with detrusor hyperreflexia and GSI, respectively.

Symptoms of voiding difficulty (i.e., hesitancy, poor stream, postvoiding fullness, or dribbling), low urine flow rate, high bladder capacity, or high residual urine volume suggest voiding dysfunction. When any of these findings is present, urodynamic testing is required to determine the cause and the mechanism (obstructive versus nonobstructive) of the voiding dysfunction.

Based on the clinical evaluation, the family physician can formulate a presumptive diagnosis and initiate treatment, using the algorithm in Figure 1 as a guide. Similar guidelines for evaluating incontinence have been used with success in elderly individuals.[27,48] The initial goal should be to be diligent in seeking out and treating all transient causes of urinary incontinence and voiding difficulty (Table 4).[48] Complex causes of incontinence are identified early, and consultation and specialized tests are obtained. Patients are then categorized as probable GSI, probable DI, or mixed GSI and DI. For GSI and DI, appropriate behavioral or medical therapy can be given, and a substantial percentage of patients can be expected to re-

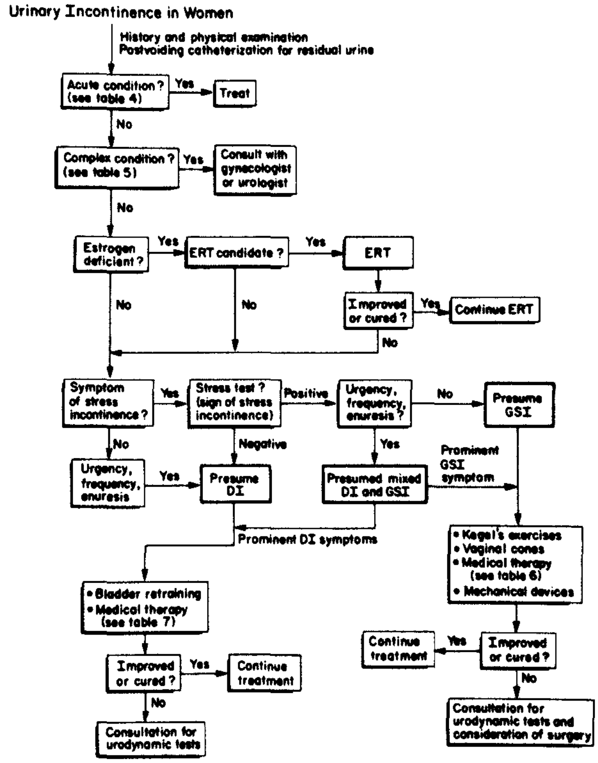

Figure 1. Algorithmic evaluation of urinary incontinence in women. ERT = estrogen replacement therapy, GSI = genuine stress incontinence, DI = detrusor instability.

Table 4. Conditions Causing Acute Urinary Incontinence.*

Delirium
Restricted mobility
Drugs
Urinary retention
Urinary infection
Urethritis
Fecal impaction
Spinal cord compression
Polyuria

*Modified and used with permission by Ouslander JG. Diagnostic evaluation of geriatric urinary incontinence. Clin Geriatr Med 1986; 2:715.

spond. Even patients with mixed incontinence have responded to various forms of conservative therapy in about 60 percent of the cases.[49]

The family physician must recognize that, even under the most typical clinical situations, the diagnosis of incontinence based only on office evaluation has limited accuracy. This diagnostic inaccuracy is acceptable if medical or behavioral treatment (as opposed to surgery) is used, because the morbidity and cost of these treatments are low and because the ramifications of no cure of incontinence (continued incontinence) are not severe. When surgical treatment of stress incontinence is considered, urodynamic testing is recommended to confirm the diagnosis.

Whenever objective clinical findings do not correlate with or reproduce the patient's symptoms, urodynamic testing is indicated for diagnosis. Trials of therapy must be followed up periodically to evaluate response. If the patient fails to improve, then appropriate consultation is indicated. Consultation with a gynecologist or urologist should also be considered for complex cases that might require urodynamic testing, surgical treatment, or both. Examples of these situations are presented in Table 5.

Treatment

Presumed Genuine Stress Incontinence

Surgery is clearly the most effective treatment for GSI. Cure rates of more than 80 percent have

Table 5. Situations in Which Consultation for the Evaluation and Treatment of Urinary Incontinence Would Be Indicated.

History
Neurologic disease
Surgery to treat urinary incontinence
Pelvic malignancy
Radiation therapy
Physical examination and office evaluation
Persistent urinary tract infection after treatment
Hematuria
Abnormal neurologic examination
Difficulty passing urethral catheter
Signs of voiding difficulty or retention
Absent bladder sensation with filling
Large bladder capacity
High postvoiding residual urine volume
Small bladder capacity
Fistula
Urethral diverticula
Failure to improve after treatment of incontinence based on clinical evaluation
Whenever objective clinical findings do not correlate with or reproduce the patient's symptoms or concerns

been consistently reported for the various urethral suspension procedures. Because some women improve with nonsurgical treatments, however, all women with GSI should have a trial of conservative therapy before corrective surgery is offered. Furthermore, some patients do not desire surgery, are poor surgical candidates, or have urinary incontinence that is not so severe as to justify major surgery.

Four main types of conservative treatment are effective for some women with stress incontinence: pelvic floor exercises, bladder retraining, pharmacologic therapy, and mechanical devices. Other novel types of nonsurgical therapy exist, such as functional electrical stimulation, but these should be prescribed only after a definitive diagnosis is made.

Physiotherapy

Physiotherapy is an important first-line method for both prophylaxis and treatment of urinary and fecal incontinence. Pelvic floor exercises were introduced by Kegel in 1948 to restore tone to perineal muscles after delivery and to treat stress urinary incontinence.[50,51] Modern studies, using objective measures for diagnosis and outcome, consistently report improvement in 50 to 75 percent of cases.[52-57]

In a typical treatment program, patients are instructed to tighten the vaginal muscles and those muscles that interrupt urination, to hold this tension for 5 to 10 seconds, then to release. This exercise should be done 10 to 20 times in each session, and the session repeated up to every hour during the day. Biofeedback with a finger inserted intravaginally or with a perineometer can aid the patient in evaluating progress. Active physiotherapy programs are performed for 2 to 6 weeks, after which daily maintenance exercises are done, ideally for life. Improvement is more likely to occur in younger women and in those with less severe disease.[57] In general, the success of pelvic floor exercises in treating stress incontinence depends on the instructor's enthusiasm and knowledge and on the patient's motivation and interest.

Weighted vaginal cones can be used to enhance the response of pelvic floor exercises. This product, marketed under the name Femina™, is a set of five lead-filled plastic conical devices ranging in weight from 20 g to 70 g. When inserted into the vagina, they provide a simple and practical aid for identifying and exercising pelvic floor muscles, thereby improving pelvic floor strength and symptoms of stress incontinence in some women. In addition, increasing the cone weights creates biofeedback to the patient on her progress. Several studies have shown that stress incontinence is improved in approximately two-thirds of patients, some of whom could avoid surgery.[58,59]

Pharmacologic Therapy — Estrogen

The vagina and urethra have similar epithelial linings as a result of their common embryologic origin. Urinary cytologic changes are similar to those of the vagina during the menstrual cycle, during pregnancy, and after menopause.[60,61] High-affinity estrogen receptors are present in surgically removed urethral tissue and pubococcygeal muscle in women.[62,63]

Hypoestrogenemia results in cytologic changes of the urethra similar to those found in the vagina. These changes can be at least partially responsible for the sensory symptoms and decreased resistance to urinary infection frequently found after menopause. Age- and estrogen-induced changes in the urethral and periurethral muscle and in the collagen of the endopelvic fascia can allow for the development and progression of lower urethral resistance, urethral detachment, and pelvic prolapse.[64]

Estrogen treatment results in mucosal cytologic changes in the urethra, similar to those of the vagina, with changes toward more intermediate and superficial cells and fewer transitional cells.[65] The cytologic changes of urethral mucosa, which occur in response to estrogen, can lead to an improved "mucosal seal effect," thereby increasing urethral resistance and lessening symptoms of urgency and frequency. Estrogenized cytologic changes in the urethral mucosa also correlate with improvement in symptoms of stress incontinence.[65]

Numerous studies have addressed the efficacy of estrogen in treating lower urinary tract symptoms in postmenopausal women. Subjective improvement or cure of stress incontinence has been reported in 20 to 71 percent of women.[66-70] Similar results have been found using various estrogen preparations, whether orally or vaginally. Fewer symptoms of urgency or frequency and fewer voiding difficulties also have been observed after estrogen therapy.[70,71] No improvement in urinary symptoms was found after treatment with progestin.[72]

A trial of estrogen therapy for estrogen-deficient women with GSI should be given in the absence of contraindications. The proper dosage and route of administration of estrogen have not been established but probably are those that reverse atrophic uroepithelial changes. Patients can be prescribed conjugated estrogens in doses of 0.625 mg/d (or a comparable estrogenic preparation and dosage). The route of administration can be oral, vaginal, or dermal. The dosage is then titrated to achieve maximum estrogenic responses in the vaginal (and urethral) epithelium with minimal side effects. Phenylpropanolamine can be used in combination with estrogen for additive effects.[73-75] Related issues of estrogen replacement therapy, such as concurrent use of progestins and assessment of risk, are beyond the scope of this article.

Pharmacologic Therapy — Nonhormonal

The bladder neck and proximal urethra in women contain predominantly α-adrenoreceptors. Stimulation of these receptors produces smooth muscle contraction in isolated tissue preparations and an increase in bladder outlet resistance.[76] Drugs used for the treatment of GSI are shown in Table 6.

Many investigators have shown that treatment of patients with stress incontinence with α-adrenergic stimulating drugs improves symptoms in some patients, probably by increasing urethral closure pressure. The drugs that have been studied include ephedrine, phenylephrine, midodrine, norfenefrine, and phenylpropanolamine. Ephedrine is a noncatecholamine sympathomimetic agent that owes part of its peripheral action to the release of noradrenalin, which also directly stimulates α- and β-adrenergic receptors. In a 14-week, double-blind crossover study that compared the effects of norephedrine chloride with placebo, Ek and co-workers[77] showed reduction of urinary leakage with the drug in 12 of 22 patients. Diokno and Taub[78] reported good to excellent results in 71 percent of patients with GSI treated with ephedrine sulfate.

Phenylpropanolamine hydrochloride (PPA) shares the pharmacologic properties of ephedrine and is approximately equal in peripheral potency while causing less central stimulation. Several

Table 6. Pharmacologic Therapy for Genuine Stress Incontinence.

Classification of Drug	Name of Drug	Minimum and Maximum Dosage	Potential Side Effects
Hormone	Estrogen	Oral: 0.3–1.25 mg every day cyclically or continuously Vaginal: 2–4 g every day then weekly for maintenance	Increased risk of endometrial carcinoma (unless opposed with cyclic progestin), irregular vaginal bleeding
α-Sympathomimetic	Pseudoephedrine hydrochloride	15 mg twice a day to 30 mg 4 times a day	Drowsiness, dry mouth, hypertension
	Phenylpropanolamine hydrochloride	50 mg every day to 75 mg twice a day	Drowsiness, dry mouth, hypertension
Tricyclic antidepressant	Imipramine hydrochloride	25 mg every day to 75 mg twice a day	Anticholinergic effects, orthostatic hypotension, hepatic dysfunction, mania; monoamine oxidase inhibitors prohibited; cardiovascular effects (especially in the elderly)
β-Sympathetic blocker	Propranolol hydrochloride	10 mg twice a day to 40 mg 3 times a day	Fatigue, lethargy, cardiovascular effects

placebo-controlled studies have evaluated PPA in the treatment of women with genuine stress incontinence. Using the dose of 50 mg twice daily, improvement was noted in 60 to 70 percent of patients, mainly in those with lesser severity of disease.[79,80] Modest increases in maximum urethral pressure were noted, but these increases did not correlate with either serum concentration or subjective response.

PPA is a component of numerous prescription and over-the-counter medications marketed for the treatment of nasal and sinus congestion and appetite suppression. Pharmacologic studies of PPA in these doses reported few clinically significant effects resulting from drug treatment.[81] Nevertheless, reports of serious complications, including seizures, stroke, and death, with over-the-counter preparations containing PPA suggest that these drugs be used with care in incontinent individuals.[82]

In general, effects of α-adrenergic drugs are most notable in patients with mild to moderate symptoms but generally do not sufficiently improve severe symptoms of stress incontinence to offer an alternative to surgical treatment. In addition, the beneficial effects immediately reverse with cessation of the drug, making it a poor choice for long-term treatment of stress incontinence.

Imipramine hydrochloride, an antidepressant with α-adrenergic agonist and anticholinergic effects, appears to improve symptoms in some women with stress urinary incontinence. Gilja, et al.[83] had a 71 percent cure rate in 21 women after treatment with imipramine. These investigators reported an increase in functional urethral length and maximal urethral pressure after a daily dose of 75 mg of imipramine.

Theoretically, β-adrenergic blocking agents might be expected to potentiate an α-adrenergic effect, thereby increasing resistance in the urethra. Gleason, et al.[84] reported success in treating stress-incontinent patients with the β-adrenergic blocking agent propranolol in oral doses of 10 mg four times daily. Although such treatment has been suggested as an alternative drug therapy for patients with sphincteric incompetence and hypertension, few if any reports of such efficacy have appeared. Other reports have noted no significant changes in urethral profile measurements in normal women after β-adrenergic blockade.

Mechanical Devices

Mechanical devices, such as pessaries, can be used to alleviate symptoms of pelvic relaxation (with or without urinary incontinence) or for patients with urinary incontinence who have not responded to other therapies or who are medically unfit for surgical treatment. These devices also can be appropriate for women with intermittent urinary incontinence, such as during upper respiratory tract infections or with exercise.

Bhatia and co-workers[85] noted that placement of a vaginal Smith-Hodge pessary in women who have stress urinary incontinence resulted in consistent and significant increases in functional urethral length and urethral closure pressure under stressful conditions when compared with prepessary studies. Clinically, 10 of 12 patients became continent, probably by stabilizing the urethra and urethrovesical junction to proper pressure transmission and by actively increasing urethral resistance to escape of urine under stressful conditions. Simultaneous voiding urethrocystometry and instrumented uroflowmetry demonstrated absence of obstruction to free flow of urine when voiding with the pessary in place. Unfortunately, pessaries are unacceptable to many women because they remain in the vagina for long periods of time, can interfere with sexual intercourse, and can result in vaginitis.

In another study using vaginal diaphragm rings, 4 of 10 women with genuine stress incontinence experienced clinical improvement in the amount of urine lost during pad tests, number of leaking episodes per week, and overall subjective assessment of response.[86] Urodynamic findings were essentially unchanged when the women were wearing the diaphragm rings, although mild restrictions in urethral mobility were noted as measured by the Q-Tip™ test.

Presumed Detrusor Instability

Bladder Retraining

Educational and bladder-retraining techniques have been shown to be highly successful in the treatment of DI. Many treatment variations exist, and acceptable rates of cure have been demonstrated with timed voiding,[87-89] biofeedback,[90] hypnotherapy,[91] and acupuncture.[92] These interventions can reflect adaptive behavioral changes,[93] or they can help the patient regain cortical inhibitory control over lower urinary tract function.[94]

In a typical bladder retraining program,[89] the patient is asked to void on schedule every 30 to 60 minutes based on her baseline daytime voiding interval. The patient is instructed to "go to the toilet and empty her bladder as completely as she can" at the scheduled time, regardless of her desire to void. If urgency occurs prior to the assigned voiding time, she is instructed to suppress the urge as long as possible, using relaxation and distraction techniques. The patient is encouraged not to void off schedule; however, if the urgency cannot be controlled, and the patient perceives that an incontinent episode is imminent, she is not prohibited from voiding. No fluid modifications are used. Patients are asked to keep daily voiding diaries, which are assessed at weekly office visits for approximately 6 weeks. Voiding intervals are progressively increased by 30- to 60-minute intervals if the patient shows a decrease in the number of incontinent episodes and tolerates the schedule without interruption. The goal of

Table 7. Pharmacologic Therapy for Detrusor Instability.*

Classification of Drug	Name of Drug	Minimum and Maximum Dosage	Potential Side Effects
Anticholinergic	Propantheline bromide	15 mg twice a day to 60 mg 3 times a day	Anticholinergic effects (dry mouth, blurred vision, drowsiness, constipation)
Musculotropic relaxant (antispasmodic)	Oxybutynin chloride	2.5 mg twice a day to 5 mg 4 times a day	Anticholinergic effects
	Dicyclomine hydrochloride	10 mg twice a day to 40 mg 4 times a day	Anticholinergic effects
	Flavoxate hydrochloride	100 mg twice a day to 200 mg 4 times a day	Anticholinergic effects
Calcium channel blocker	Nifedipine	10 mg twice a day to 120 mg per day	Edema, hypotension, flushing, dizziness, nausea, abdominal pain, rash, weakness, palpitations
	Terolidine hydrochloride	12.5 to 25 mg twice a day	
Tricyclic antidepressant	Imipramine hydrochloride	25 mg every day to 75 mg twice a day	Anticholinergic effects, orthostatic hypotension, hepatic dysfunction, mania; monoamine oxidase inhibitors prohibited; cardiovascular effects (especially in the elderly)

*Modified and used with permission by Bent AE. Etiology and management of detrusor instability and mixed incontinence. Obstet Gynecol Clin North Am 1989; 16:853-68.

the program is to void at 3-hour intervals and to eliminate incontinence.

Pharmacologic Therapy

Many drugs have been tried and studied for the medical therapy of DI. Table 7 shows the most commonly used drugs, their dosages, and some of their important side effects.[95] There is overlap among the categories listed; for example, all the drugs except estrogen and nifedipine have anticholinergic properties. Oxybutynin and flavoxate have local anesthetic properties, as well as antispasmodic and anticholinergic properties. Each of the drugs listed appears to be effective, at least for some patients. A placebo, however, is often found to be effective as well, so individual patient responses should be interpreted with caution. Pharmacologic therapy should be used in conjunction with a bladder-retraining program whenever possible.

Side effects of these medications often limit their usefulness, especially in older women. Initial dosages for elderly patients should be low; physicians should observe for effects on other medical problems and for interactions with other medications.

Estrogen treatment has been shown to reduce urgency and frequency, but not incontinence, in women with DI.[71] Although there are few data to support its use for DI without GSI, a trial of estrogen is reasonable for eligible estrogen-deficient women.

Presumed Mixed DI and GSI

When the clinical evaluation suggests the presence of both GSI and DI, a presumptive diagnosis of mixed incontinence is made. Urodynamic evaluation can help to clarify the contribution of each disorder to the patient's symptoms and should be accomplished prior to consideration of surgery. Conservative therapy can be aimed at either disorder or at both. In general, the component believed to be chiefly responsible for the patient's symptoms is treated first. The nonsurgical treatments for DI and GSI can be selected and combined on an individualized basis. Because estrogen replacement can be beneficial in both DI and GSI, it probably should be prescribed unless contraindicated. If drug therapy is considered, imipramine can offer the advantage of both anticholinergic and α-adrenergic-stimulating properties.

Conclusion

Urinary incontinence is a common health problem in women that often goes unrecognized and untreated. Family physicians should inquire about this problem in their patients and, when present, should initiate a basic evaluation using the guidelines in this paper. At least one-half of incontinent women can be treated successfully with behavioral and pharmacologic methods. Women who do not improve after office evaluation and nonsurgical treatment can then receive appropriate consultation and specialized evaluation.

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