Urinary Incontinence in the Elderly Population

DARRYL S. CHUTKA, M.D., KEVIN C. FLEMING, M.D., MARY P. EVANS, M.D., JONATHAN M. EVANS, M.D., AND KAREN L. ANDREWS, M.D.

• *Objective*: To describe the causes, evaluation, and management of urinary incontinence in the elderly population.

• *Design*: We reviewed pertinent articles in the medical literature and summarized the types of incontinence and contributing factors.

• *Results*: Urinary incontinence is common in elderly patients and often has a major role in determining whether a person can remain independent in the community or requires nursing home placement. Urinary incontinence is not a single entity but rather several different conditions, each with specific symptoms, findings on examination, and recommended treatment. Thus, accurate classification is important for appropriate management. Because of the complexity of urinary incontinence, many physicians are uncomfortable with undertaking assessment and treatment. Hence, many patients are not asked about incontinence, and the condition remains untreated and often considered a natural consequence of the aging process. Urinary incontinence can be treated and either cured or alleviated with treatment.

• *Conclusion*: Elderly patients should be asked about symptoms of urinary incontinence because appropriate assessment and treatment can usually provide relief.

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BPH = benign prostatic hyperplasia; UI = urinary incontinence

Urinary incontinence (UI) is a common but poorly understood problem in the elderly population.[1] An estimated 15% of community-dwelling elderly persons and 50% of institutionalized elderly persons have severe urinary incontinence.[2-5] As the degree of functional dependence increases, the frequency of incontinence increases as well. The prevalence of incontinence may be appreciably underestimated because physicians rarely ask patients about the problem, and patients seldom initiate discussions about incontinence with their physician.[6] Older patients may assume that UI is a normal consequence of aging. Some patients may be embarrassed by their incontinence or may fear invasive testing and thus avoid evaluation.

UI commonly results in medical, social, and economic consequences.[7,8] Incontinence is a common reason for institutionalization among elderly persons. The care of incontinent nursing home residents is considerably more expensive than of continent residents and necessitates more nursing time and frequent linen and clothing changes.[9]

UI can result in skin irritation and can contribute to skin breakdown or pressure sores. The social consequences include guilt and isolation; some elderly persons are afraid to leave their homes.[10] Absorbent undergarments may reduce this fear but are expensive and can delay evaluation.

In this article, we will review the pathophysiologic features and evaluation of UI and discuss management issues. Older adults need to be assured that, for most patients, diagnosis and treatment options are inexpensive, noninvasive, and successful.

URINARY ANATOMIC AND PHYSIOLOGIC FEATURES

For a better understanding of urinary incontinence in elderly persons, one needs to appreciate the anatomic and physiologic changes that result from aging.[11] The urinary bladder is a muscular reservoir with two functions. When the muscular wall (detrusor) relaxes, urine storage results; when it contracts, micturition occurs. The wall of the bladder is composed of interlacing bundles of smooth muscle, which allows the detrusor to expand and contract and thereby facilitate both urine storage and emptying.

Sensory stretch receptors located within the bladder wall help to assess the degree of bladder fullness. This information is transmitted up the spinal cord through the spinothalamic tracts to the central nervous system. The brain

From the Section of Geriatrics (D.S.C., K.C.F., J.M.E.), Department of Obstetrics and Gynecology (M.P.E.), and Department of Physical Medicine and Rehabilitation (K.L.A.), Mayo Clinic Rochester, Rochester, Minnesota.

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sends inhibitory signals when detrusor relaxation is desired and excitatory signals when detrusor contraction is desired. This information from the brain is transmitted down the spinal cord to the urinary bladder through the dorsal columns and corticospinal tracts. The bladder has *somatic*, *parasympathetic*, and *sympathetic* innervation (Fig. 1).

The pudendal nerve is the somatic component of bladder innervation and innervates the external sphincter. When stimulated, it produces contraction of the external urethral sphincter. The external sphincter has an infrequent role in maintaining continence because it is able to remain tightly contracted for only a brief period. This sphincter normally contracts during transient increases in intra-abdominal pressure, such as occur with coughing, sneezing, and laughing.

The parasympathetic nerve fibers arise from the second through the fourth segments of the sacral spinal cord and innervate the detrusor muscle. Stimulation occurs when micturition is desired. When stimulated, the detrusor contracts; the result is increased intravesicular pressure.

The internal urinary sphincter is innervated by the sympathetic nervous system. These nerves originate from the lower thoracic and upper lumbar segments of the spinal cord. When these nerves are stimulated, the internal sphincter relaxes.

The physiologic details of micturition are complex; however, a basic understanding is necessary to appreciate the causes and treatment of incontinence.[12] As urine fills the bladder through the ureters, the detrusor stretches and allows the bladder to expand. As the bladder fills, stretch receptors within the bladder wall are stimulated, and the brain is given information about the amount of urine within the bladder.

Approximately 300 mL of urine must be in the bladder before the intravesical pressure increases enough for the brain to recognize a sense of bladder fullness. With low bladder volumes, the sympathetic nervous system is stimulated and the parasympathetic system is inhibited; thus, the internal sphincter contracts and the detrusor relaxes. When the bladder is full and micturition is desired, the inhibitory signals from the brain are replaced by impulses that stimulate the parasympathetic system (and result in detrusor contraction) and that inhibit the sympathetic system (and cause internal sphincter relaxation). The intravesical pressure then increases to a point at which it exceeds the resistance within the urethra, and urine flows out of the bladder.

Once the bladder has emptied, the brain again sends impulses that result in parasympathetic inhibition and sympathetic stimulation; hence, detrusor relaxation and internal sphincter contraction occur. The urinary bladder is again ready to be filled with urine.

CAUSES OF INCONTINENCE

Although the anatomic and physiologic changes in the urinary tract that result from normal aging do not cause UI, they do create a situation that allows incontinence to occur more

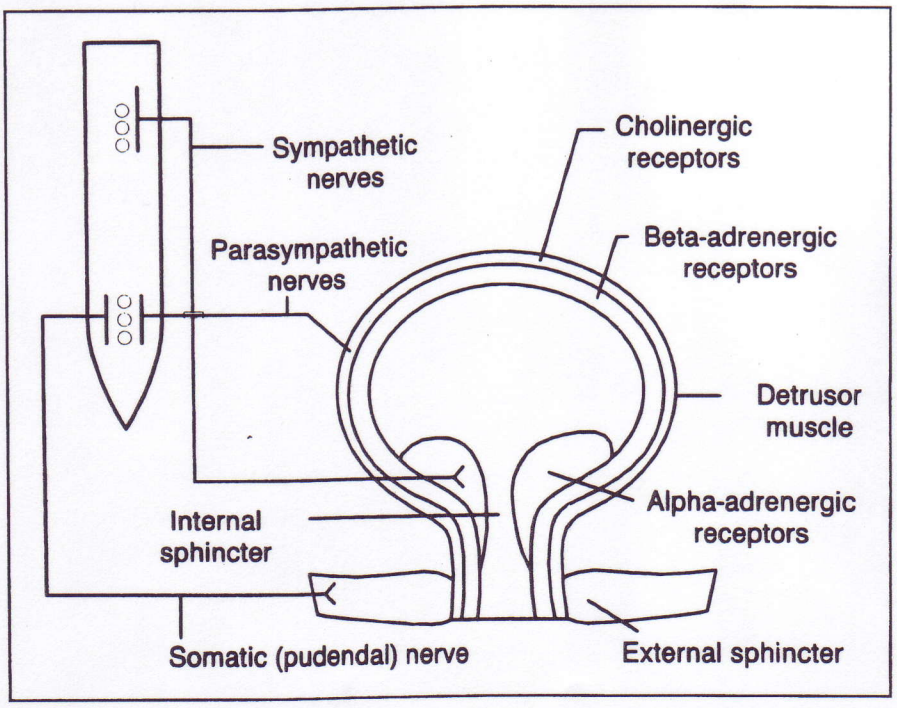

Fig. 1. Diagram showing innervation of urinary bladder.

easily. Advancing age is associated with decreased size of the urinary bladder and decreased bladder volume; therefore, more frequent bladder emptying (urinary frequency) is common in the geriatric population. Many elderly persons experience early detrusor contractions, even at low bladder volumes, and have difficulty suppressing such contractions. The outcome is a sense of urgency to empty the bladder.

In addition to these changes of normal aging, many disease states commonly experienced by elderly persons can contribute to the problem of UI. Urinary tract infections, prostatism, immobility, pelvic floor dysfunction, and fecal impactions are typical examples. Although age-related changes can contribute to incontinence and therefore need to be considered in the evaluation, one must never assume that UI in an elderly patient is due to aging alone. For appropriate assessment, classification by history, examination, and results of testing is important.

TYPES OF INCONTINENCE

Established UI can usually be divided into one of four types—*detrusor overactivity* (urge incontinence), *overflow incontinence*, *stress incontinence* (outlet incompetence), or *functional incontinence*. Patients with these disorders often have classic histories or typical physical findings. Unfortunately, elderly patients may have more than one type of UI; accordingly, the history and physical findings may be difficult to interpret.

Detrusor Overactivity (Urge Incontinence).—Detrusor overactivity is a common cause of UI in the elderly population, occurring in 40 to 70% of cases. This type of incontinence is also known as detrusor instability, detrusor hyperreflexia, or uninhibited bladder. Patients with detrusor overactivity have early, forceful detrusor contractions, well before the bladder is full. This situation creates a state of urinary urgency and frequency. Patients with detrusor overactivity tend to lose small to moderate volumes of urine. If the detrusor contraction is strong enough to overcome the urethral resistance, incontinence occurs.

Detrusor overactivity can be found in conditions of defective central nervous system inhibition or increased afferent sensory stimulation from the bladder. Examples of disorders that impair the ability of the central nervous system to send inhibitory signals are strokes, masses (tumor, aneurysm, hemorrhage), demyelinating disease (multiple sclerosis), and Parkinson's disease. Increased afferent stimulation from the bladder can result from lower urinary tract infections, atrophic urethritis, fecal impaction, uterine prolapse, or benign prostatic hyperplasia (BPH).

The diagnosis of detrusor overactivity is primarily based on the history. Patients have no pathognomonic findings on physical examination, although a careful pelvic and rectal examination and neurologic screening can occasionally reveal anatomic abnormalities (for example, uterine prolapse or fecal impaction) or evidence of neurologic disease. The clinician should carefully assess the symptoms of patients with BPH. Many patients will describe both obstructive symptoms (such as weak urinary stream or incomplete bladder emptying) from the enlarged prostate and the irritative symptoms (urgency or frequency) from the detrusor overactivity. Although surgical treatment alleviates the obstructive symptoms, it often has no effect on relieving the irritative symptoms.

Overflow Incontinence.—Overflow incontinence is less common than detrusor overactivity; it is estimated to occur in 7 to 11% of incontinent elderly patients. Patients with overflow incontinence commonly have symptoms of substantially reduced urinary stream, incomplete or unsuccessful voiding, and frequent or even continuous urinary dribbling. Overflow incontinence is generally due to a bladder with contractile dysfunction (hypotonic or atonic bladder) or obstructed urinary outflow. In either case, large bladder volumes result in an intravesicular pressure that exceeds the intraurethral resistance and ultimately in symptoms of urinary dribbling.

Overflow incontinence secondary to an atonic bladder is often transient after general or regional anesthesia, after bladder instrumentation, or with the use of various medications such as narcotics. Contractile dysfunction of the bladder can be caused by disease of the peripheral nerves—for example, diabetic peripheral neuropathy—or sacral nerve roots. Bladder outlet obstruction in men is usually attributable to an enlarged prostate from BPH. It may also be caused by pelvic neoplasm or fecal impaction. Physical examination often reveals a distended bladder, and measurement of urine volume after voiding reveals an increased residual volume. Patients also have low urinary flow rates on urodynamic tests.

Stress Incontinence (Outlet Incompetence).—Urinary stress incontinence, also known as outlet incompetence, is common in women. Patients describe losses of small volumes of urine with activities that transiently increase the intra-abdominal pressure (such as coughing, sneezing, running, or laughing). Loss of urine can result from a reduced tone of the internal and the external urinary sphincter. Although this type of incontinence can occur in men, it is usually limited to those who have had internal sphincter damage from urologic procedures.

In women, the cause of urinary stress incontinence is usually pelvic relaxation as a result of childbirth and the aging process. These changes become more pronounced after menopause, when estrogen deficiency allows atrophy of the genitourinary tissues. Pelvic relaxation, including uterine prolapse and cystocele, allows descent of the normal urethrovesical angle (Fig. 2). This anatomic distortion al-

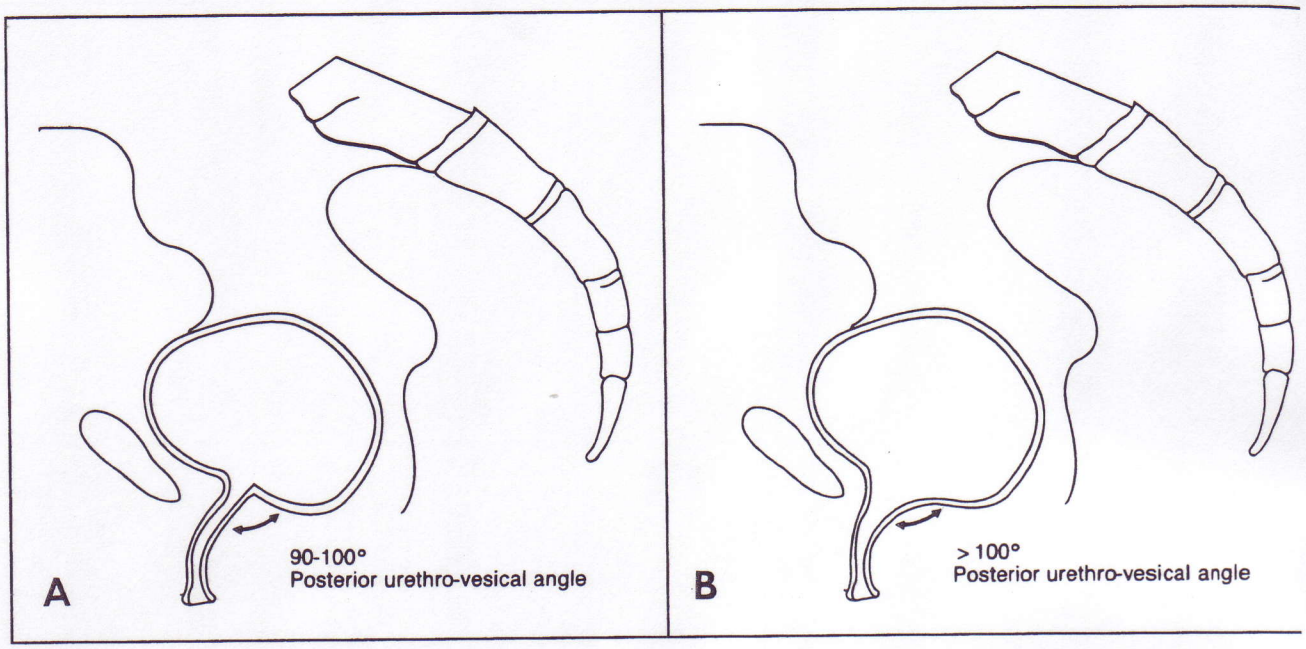

Fig. 2. Diagrams depicting posterior urethrovesical angle. *A*, Normal relationship. *B*, With pelvic relaxation (from aging, childbirth, a other factors), angle is increased.

lows the urethral sphincter to be more vulnerable to increased intravesical pressure from any activity that results in increased intra-abdominal pressure. Loss of urine then results. Other less common causes include cauda equina lesions or peripheral neuropathy. Physical examination may reveal evidence of pelvic relaxation, such as cystocele, rectocele, or uterine prolapse. Loss of urine can usually be demonstrated by having the patient cough while in the supine position.

Functional Incontinence.—Patients with functional incontinence are those who would otherwise be continent but, because of physical or cognitive problems or use of various medications, are unable to reach the toilet facilities in time. This result may be ascribed to decreased mobility due to severe arthritis, weakness (from strokes or deconditioning), contractures, or the use of physical restraints. Functional incontinence may also be caused by medications, impaired cognition (for example, from delirium or dementia), or excessive distance of the patient from the toilet facilities. Patients with peripheral edema from any cause often have fluid shifts at night from recumbency, resulting in nocturia. This situation can exacerbate UI of any cause or can contribute to its development when present in combination with cognitive impairment, immobility, or the effect of various medications. Generally, patients with functional incontinence have normally functioning urinary systems, and the incontinence is a result of some external factor. Consequently, no typical findings will be noted on physical examination. Finally, some medications can affect urinary continence (Table either as a result of urine production (diuretics) or by dire effects on the detrusor muscle (anticholinergics) or interr sphincter (sympathetic agonists or antagonists).[13]

EVALUATION OF INCONTINENCE

Assessment of the patient with established UI involves eli tation of a thorough medical history and performance of physical examination. Occasionally, various simple labor tory tests are necessary. More elaborate tests, includi urodynamic studies, are sometimes needed to determine t type of incontinence that is present.

History.—The history is the most important part of t evaluation of UI. Patients should be asked how frequen incontinence is a problem and how much urine is lost w each episode of incontinence. Small volumes of urine a lost in overflow incontinence and outlet incompeten whereas moderate volumes are lost in detrusor overactivi Patients should be asked what activities produce an episo of incontinence. Precipitating factors such as coughing sneezing are highly suggestive of outlet incompetence, t these activities may also trigger premature detrusor contr tions. Patients should be questioned about whether and what degree their incontinence limits their lifestyle a specifically, whether any degree of social isolation has sulted because of the incontinence. Other important qu tions include whether they use protective absorbent und garments or pads, and how frequently they need to char

Table 1.—**Medications That Can Affect Continence**

Type of drug	Potential action
Diuretics	Cause brisk filling of bladder
Anticholinergics	Impair detrusor contraction
Sedative or hypnotics	Cause confusion
Narcotics	Impair detrusor contraction
α-Adrenergic agonists	Increase tone of internal sphincter
α-Adrenergic antagonists	Decrease tone of internal sphincter
Calcium channel blockers	Decrease detrusor contraction

their clothes because of leakage of urine. The number of episodes of nocturia should be recorded, as well as whether nocturnal incontinence occurs.

Symptoms of urinary urgency should suggest the presence of detrusor overactivity. Increased urinary frequency is often noted in patients with overflow incontinence and detrusor overactivity. Patients who describe difficulty initiating urination, straining to void, or a decreased force of their urinary stream may have a bladder outlet obstruction. The frequency and severity of loss of urine can be more accurately documented by having the patient complete a weekly diary or log, in which the amounts and types of fluids consumed, the frequency and volumes of voidings, and the frequency and estimated volumes of incontinent episodes are recorded. Often within only a week or two, a pattern of the type of UI emerges.

The duration that the incontinence has been present and the progression of symptoms may provide some clues about the likelihood of reversibility. The patient's functional[14] and cognitive status should be determined. Severe constipation, diarrhea, or fecal incontinence may suggest neurologic or autonomic dysfunction or a fecal impaction.

The past medical history should also be reviewed. The presence of diabetes mellitus (especially with known neuropathy), BPH, neurologic disease, recurrent urinary tract infections, pelvic disease, and postmenopausal genitourinary atrophy may predispose or contribute to incontinence. Prior pelvic or abdominal operations or radiation treatment should be documented. Hysterectomy, previous bladder suspension procedures, and prostate operations can be important historical clues. Women should be asked about their childbirth experiences, inasmuch as multiparity, large babies, and prolonged labor may predispose to sphincter incompetence or pelvic floor dysfunction. Previous attempts at modification of UI should be reviewed: Was modification ever attempted? Was it successful? Why was it discontinued?

Physical Examination.—A complete, thorough physical examination should be performed on all patients with incontinence. Examination of the abdomen should attempt to evaluate bladder distention. A distended bladder is often palpable in patients with overflow incontinence. Assessment of the anal wink reflex and a rectal examination should also be done to disclose any neurologic deficiency, prostate abnormalities, fecal impaction, or pelvic pathologic condition. Pelvic examination may be useful for detection of cystocele, uterine prolapse, rectocele, or atrophic urogenital tissues. Internal sphincter weakness can be assessed by having the patient cough while lying supine on the examination table. Leakage of urine in this position is suggestive of outlet incompetence. A thorough neurologic examination to assess for evidence of central nervous system, spinal, or peripheral nerve disease should also be performed.

Laboratory Tests.—Selected laboratory tests may be of use in the evaluation of UI. Results of urinalysis may suggest infection, inflammation, or a malignant lesion. A urine culture should be obtained if the urinalysis shows evidence of infection or if the history suggests the possibility of urinary tract infection. Although acute urinary tract infections can produce incontinence, no firm evidence indicates that long-standing, asymptomatic bacteriuria is associated with incontinence or that treatment of asymptomatic bacteriuria will alleviate incontinence.[15-17] Blood tests should include a measure of renal function, such as a serum creatinine or blood urea nitrogen. Because of reduced muscle mass, however, these measures can substantially underestimate the actual renal function in elderly patients. If the history suggests a polyuric condition, serum calcium and glucose values should also be determined. A simple test that can yield useful information is a postvoiding urinary tract catheterization to record the residual volume. A urine volume that exceeds 50 mL may indicate urinary obstruction or a hypotonic bladder.

Urodynamic Testing.—The specific cause of UI in a patient can usually be established without formal urodynamic testing. Although urodynamic studies are frequently performed in the evaluation of incontinence, little information exists about specific indications for testing. Urodynamic testing must be performed by trained personnel in order to provide valid, reproducible results. Nevertheless, some elderly persons with UI will have normal urodynamic findings, and others without incontinence have abnormal urodynamic results. Despite these problems, urodynamics can be helpful in the assessment of incontinence.[18,19] They may be especially useful in patients with more than one type of incontinence, with a confusing or inconsistent history, with prior bladder or sphincter procedures, or with no improvement from standard treatment. Urodynamic testing includes cystometry, urinary flow measurement, urethral pressure profile, and selected imaging studies.

Cystometry.—Cystometry measures pressures during bladder filling and can detect early detrusor contractions. A catheter is inserted into the bladder, and the bladder is filled with saline. The intravesical pressure is measured as the volume within the bladder is increased. Of all the uro-

dynamic studies, cystometry is probably the most useful in the assessment of the patient with detrusor overactivity. Such patients will demonstrate detrusor contractions and characteristic pressure increases well before the bladder is filled. Multichannel urodynamic testing allows simultaneous measurements of intravesical, intra-abdominal, and urethral pressures during resting, provocative maneuvers, and voiding and can distinguish among various types of incontinence.

Urinary Flow Measurement.—Occasionally, a measurement of urinary flow is used for detecting a urinary obstruction. The flow pattern will be abnormal in patients with a poorly contracting bladder. Both mean and peak urinary flows are measured. A mean urinary flow can easily be determined without elaborate equipment simply by measuring the volume of voided urine and dividing by the time of urination. A normal urinary flow rate should be at least 10 mL/s.

Urethral Pressure Profile.—The urethral pressure profile measures the pressure within the urethra and its functional length. This profile indicates whether the resistance is sufficient to prevent leakage of urine from the urinary bladder. This test may be useful for evaluation of urinary stress incontinence.

Imaging Studies.—Imaging studies for urodynamic analyses include two radiologic tests—intravenous pyelography and voiding cystourethrography. Intravenous pyelography is occasionally useful if structural abnormalities are suspected.[20] Voiding cystourethrography may detect bladder diverticula, pelvic floor relaxation, bladder outlet incompetence, urinary reflux, or outlet obstruction.

Imaging of the genitourinary tract by ultrasonography may be done to measure residual bladder volume when catheterization cannot be performed or to assess for the presence of hydronephrosis in patients with high residual urine volumes.[21-23]

Urologic Evaluation.—Most cases of incontinence can be effectively evaluated by the primary-care physician. For certain patients, however, a urologist, gynecologist, or physiatrist should be consulted (Table 2). Assessment by a gynecologist with an interest or training in incontinence may be useful in women with prior bladder suspension procedures, pelvic floor relaxation (for example, cystocele, rectocele, or uterine prolapse), or pelvic masses. In some regions, physiatrists have specialized in the evaluation and treatment of UI, especially in those patients with functional or cognitive limitations.

TREATMENT OF INCONTINENCE

Most cases of UI can be effectively treated and the symptoms alleviated, provided the type of incontinence present is determined.

Table 2.—**Indications for Urologic Consultation in Patients With Urinary Incontinence**

Diagnosis is unclear (for example, more than one type of incontinence is described)*
Overflow incontinence is documented
Patient does not respond to treatment
Gross or microscopic hematuria is present
Findings on prostate examination suggest a malignant lesion

*Urodynamic testing may be necessary.

Detrusor Overactivity.—Patients with detrusor overactivity often respond to behavioral therapy consisting of bladder retraining, if they are motivated to do so and are cognitively intact.[24-27] For example, such patients are instructed in a schedule for intake of fluids, voiding techniques, and scheduled voiding. Institutionalized patients can also benefit from behavioral training by using scheduled toileting or prompted voiding.[28-30] Such methods are caregiver-dependent and require a nursing staff dedicated to the management of patients with incontinence.

Detrusor overactivity also responds to various pharmaceutical agents (Table 3). Acetylcholine is the neurotransmitter that mediates detrusor contraction. Therefore, anticholinergic medications are often used to suppress these early contractions. Commonly used agents include oxybutynin chloride, flavoxate hydrochloride, and imipramine hydrochloride.[31-34] When therapy with these drugs is initiated, the dosage should be low and gradually increased to therapeutic level to minimize adverse effects, such as dry mouth, dry eyes, constipation, confusion, orthostatic hypotension, and tachycardia. Although not approved specifically for use in incontinence, calcium channel blockers have been shown to be useful in the treatment of detrusor overactivity because of their direct effect on smooth muscle relaxation.[35] Special care must be taken when these medications are used—especially in patients who may have urinary outflow obstruction—because these drugs can precipitate urinary retention. In patients with a urinary tract infection or symptoms of outflow obstruction, a postvoiding residual urine volume should be determined as part of the evaluation.

Stress Incontinence.—Patients with stress incontinence have inadequate internal sphincter tone and urethral resis-

Table 3.—**Medications Useful for Treating Detrusor Overactivity or Stress Incontinence**

Drug	Dosage
Oxybutynin chloride	5 mg 3-4 times/day
Flavoxate hydrochloride	100-200 mg 3-4 times/day
Imipramine hydrochloride	25-50 mg 2-3 times/day
Propantheline bromide	7.5-15 mg 3-4 times/day

tance to prevent loss of urine when bladder pressure transiently increases. The goal in nonsurgical treatment is to increase internal sphincter tone.

Pelvic floor exercises (for example, Kegel exercises or vaginal cones) can be effective in motivated patients.[36-38] These exercises strengthen both the periurethral and the pelvic floor muscles. They are easy to perform but must be done frequently throughout the day and continued for long-term effect. Patients can identify the pelvic floor muscles by attempting interruption of voiding or by digital palpation during contraction. Most proponents recommend 10 to 20 pelvic floor contractions for 10 seconds each, 3 times a day. Beneficial effects may not be noted until these exercises have been done for 6 to 8 weeks. Reported improvement or cure rates have been as high as 77%. These results compare favorably to treatment with medications. Continued benefit after improvement with pelvic floor strengthening depends on the patient's motivation and ability to continue practicing the pelvic floor exercises.

α-Adrenergic agonists such as phenylpropanolamine hydrochloride and pseudoephedrine increase the internal sphincter tone and bladder outflow resistance.[39] Intermittent use of these medications (for example, for planned activities) can be beneficial. These drugs should be used cautiously in patients with hypertension or a history of cardiac arrhythmias.

Estrogen replacement therapy can be helpful in improving periurethral and vaginal tissue thickness and quality.[40,41] Topical, oral, or transdermal preparations of estrogen are all effective. Topical hormonal therapy is generally adequate unless other systemic effects are desired.

Several surgical procedures may also prove helpful for stress incontinence attributable to pelvic relaxation or internal sphincter insufficiency.[42,43] In women, correction of pelvic relaxation and reestablishment of the normal urethrovesical angle can improve urinary retention. The placement of an artificial sphincter, usually as a last resort, may also be beneficial in female patients or in men in whom complete sphincter insufficiency has developed.[44,45] Local collagen injections have also been used recently in selected patients to help alleviate urinary stress incontinence.

Overflow Incontinence.—Patients with overflow incontinence have difficulty emptying their bladder; therefore, the goal of treatment is to improve bladder drainage. Occasionally, new onset of overflow incontinence is precipitated by a new medication, anesthesia, or surgical procedure. These patients often benefit from bladder drainage for a few days, after which normal bladder function resumes. Incontinent persons with long-standing obstruction to urinary outflow and overflow incontinence should be considered for surgical correction unless bladder atony is evident. Pharmacologic agents are also available for patients who are not surgical candidates. α-Adrenergic antagonists such as prazosin hydrochloride, terazosin hydrochloride, or doxazosin mesylate reduce internal sphincter tone and can improve the flow of urine. These agents must be used cautiously in elderly patients because of their propensity to cause orthostatic hypotension. Doses should be low initially and gradually increased as tolerated. Finasteride may decrease the size of the prostate gland in some men such that urinary flow will improve, although no immediate effect should be anticipated. Its efficacy in the treatment of UI is unclear.

Patients with overflow incontinence resulting from a hypotonic or atonic bladder can benefit from medications with cholinergic agonist activity, such as bethanechol; however, little evidence suggests that long-term success can be expected. For optimal effect, bethanechol should be administered 20 minutes before voiding is attempted. Postoperative patients are the most likely to benefit from short-term use of this medication. Patients with overflow incontinence can also be instructed in assistive voiding techniques (for example, abdominal strain or Credé maneuver).

Patients with overflow incontinence may also be managed with intermittent self-catheterization or indwelling bladder catheterization.[46] In patients who have new-onset incontinence from a transient hypotonic or atonic bladder, as is occasionally noted after indwelling catheterization in the hospital, intermittent bladder catheterization should be used until the bladder tone returns. Initially, a catheter should be inserted every 4 to 6 hours after a prompted or attempted void in order to keep the bladder volumes less than 400 mL. Subsequently, the frequency of catheterizations should be based on the residual urine volumes. As the residual volume of urine decreases, the frequency of catheterizations should also decrease.

Intermittent self-catheterization may also be used for long-term management of patients with overflow incontinence who are cognitively intact and have adequate manual dexterity.[47] Most of these patients can be taught safe self-catheterization techniques with clean catheters (sterility is unnecessary). In the management of nursing home residents with long-term UI, intermittent catheterization by the nursing staff is usually prohibitively expensive (because of associated nursing and supply costs).

Long-term, indwelling urinary catheterization is indicated for patients who are unable to empty their bladder and have not responded to other treatment measures. Selected groups of patients such as the terminally ill or those for whom frequent catheterizations would be difficult or uncomfortable may also benefit from indwelling catheterization. External (condom) catheters for male patients can also be helpful, although their use may be limited by improper fit, leakage, and skin irritation or breakdown.

Functional Incontinence.—Treatment of functional incontinence depends on the successful management of causative or contributing conditions. Mobility can be improved by relieving pain and providing equipment for patients suffering from arthritis, contractures, deconditioning, and neurologic impairments. Environmental modifications (for example, improving the lighting, using a bedside commode, or reducing the distance to the toilet) can be useful in selected patients.

UI associated with delirium usually resolves with treatment of the underlying cause of the confusional state. Management of peripheral edema may decrease nocturia and its contribution to UI. Patients with dementia may benefit from prompted voiding, scheduled voids, and attention to behavioral signals that indicate a desire to void. Adjustment of potentially offending medications (cessation or dose reduction) should be considered. In patients who abuse alcohol or in patients with UI exacerbated by "safe" levels of alcohol use, cessation of ingestion of any alcohol should be considered.

Absorbent undergarments are often used by incontinent patients.[48] Several types are available, some disposable and others reusable. Although these products can help elderly patients regain freedom lost as a result of UI, they may cause many patients to forego medical evaluation and merely accept the incontinence as another age-related inconvenience.[49] Absorbent undergarments are expensive and may cause skin irritation and breakdown with long-term use.

INCONTINENCE IN LONG-TERM-CARE SETTINGS

At least 50% of nursing home residents have a major problem with UI. Many of these residents can benefit from behavioral therapy, such as scheduled toileting, habit training, and prompted voiding. Because of the high frequency of cognitive impairment attributable to dementia, a considerable percentage of nursing home residents will not benefit from various types of behavioral therapy. Federal guidelines suggest that nursing home residents with UI should undergo evaluation of incontinence and an attempt at treatment when feasible.[50] Therefore, identifying those patients who have potential to respond to therapeutic interventions becomes important. Evidence now suggests that nursing home residents who are likely to benefit from behavioral therapy for UI can be easily identified. Incontinent nursing home residents who respond to a simple, noninvasive assessment consisting of a 3-day trial of prompted voiding have potential to show long-term benefit in control of their UI with use of prompted voiding.[51]

CONCLUSION

UI is a common condition in the elderly population, both in the community and in long-term-care settings. Although most patients with incontinence would benefit from assessment and appropriate treatment, the majority do not seek medical evaluation. Several different types of incontinence exist, and the history is usually the most important part of the evaluation. Only rarely are elaborate tests necessary. With a combination of behavioral, pharmacologic, and occasionally surgical treatments, most patients can experience substantial improvement or cure of their symptoms of incontinence. Most cases of UI can be evaluated and treated by the primary-care physician, although a specialist should be consulted for selected patients.

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End of **Symposium on Geriatrics,** Part VII.
Part VIII will appear in the February issue.