

# A current perspective on geriatric lower urinary tract dysfunction

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Lower urinary tract dysfunction—such as urinary incontinence (UI), detrusor overactivity, and benign prostatic hyperplasia—is prevalent in elderly persons. These conditions can interfere with daily life and normal functioning and lead to negative effects on health-related quality of life. UI is one of the most common urologic conditions but is poorly understood elderly persons. The overall prevalence of UI increases with age in both men and women. Elderly persons often neglect UI or dismiss it as part of the normal aging process. However, UI can have significant negative effects on self-esteem and has been associated with increased rates of depression. UI also affects quality of life and activities of daily living. Although UI is more common in elderly than in younger persons, it should not be considered a normal part of aging. UI is abnormal at any age. The goal of this review is to provide an overview of the cause, classification, evaluation, and management of geriatric lower urinary tract dysfunction.

**Keywords:** Aged; Lower urinary tract symptoms; Urinary bladder; Urinary incontinence

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## INTRODUCTION

The rapid aging of the world's population is one of the major global demographic trends, driven by a reduction in fertility and mortality [1]. The number of people with age-related disease has increased substantially because increased life expectancy has led to overall aging of the population [2]. Many elderly persons experience disease, disability, and dependency, which are associated with high costs for health care and social care [3]. It is also well known that the South Korean population is rapidly aging, as the proportion of elderly persons has increased dramatically [4].

Lower urinary tract dysfunction—such as urinary incontinence (UI), detrusor overactivity (DO), and benign

prostatic hyperplasia—is prevalent in elderly persons. These conditions, which occur alone or in combination, can interfere with daily life and normal functioning and can lead to negative effects on health-related quality of life [5].

UI is one of the most common urologic conditions, but it is poorly understood in the elderly population [6,7]. An estimated 15%–35% of community-dwelling elderly persons and 50% of institutionalized elderly persons have severe UI [4,6]. The overall prevalence increases with age in both men and women. The prevalence of UI may be appreciably underestimated because physicians rarely ask patients about this problem, and patients seldom initiate discussions about UI with their physicians [6,8]. UI can have significant negative effects on self-esteem and has been associated with

**Received:** 14 January, 2015 • **Accepted:** 9 February, 2015

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increased rates of depression [9,10]. UI also negatively affects quality of life, including daily activities such as work, travel, social interaction, physical activity, sexual function, and sleep [11,12]. It may result in increased dependence on caregivers [13].

Elderly persons often neglect UI or dismiss it as a part of the normal aging process [14]. Some patients may be embarrassed by their UI or fear diagnostic intervention and thus avoid evaluation [6]. Although UI is certainly more prevalent among elderly persons, it should not be considered a natural or inevitable consequence of growing older [13]. UI is abnormal at any age. Regardless, UI is usually treatable and often curable at all ages, even in frail elderly persons; however, the approach must differ significantly from that used in younger patients [15].

## ANATOMICAL AND PHYSIOLOGICAL CHANGES WITH AGE

UI is common in the elderly population because the aging process is associated with many changes in the lower urinary tract [16]. Bladder sensation, contractility, and the ability to postpone voiding are often decreased. Bladder capacity does not decrease with age per se, although it is smaller in patients with DO [15,17]. In previous studies, the confounding effects of DO in elderly patients were not explored. The ability of the kidney to concentrate urine at night is diminished. This fact, coupled with age-related sleep disturbance, results in 1–2 episodes of nocturia in elderly persons [15]. Postvoid residual (PVR) volume increases with age, but to no more than 50–100 mL, and the prostate gland is enlarged in men [15,16]. Urethral length and maximum closure pressure probably decrease with age, and the urethral mucosa becomes atrophic because of a decrease in estrogen in women [18,19]. The prevalence of involuntary detrusor contractions increases with age in both sexes [15,16]. The pathophysiology leading to UI in elderly persons may be complicated. Thus, the diagnosis and treatment of geriatric UI are important issue in the health care of the elderly population [16].

## CAUSES OF UI

The International Continence Society defines UI as the complaint of any involuntary leakage of urine [20,21]. Although the anatomical and physiological age-related changes in the lower urinary tract do not cause UI, they lead to a situation that allows UI to occur more easily [6]. There are two main categories of UI: transient UI and persistent

or established UI. In elderly patients, it is important to differentiate transient UI from established UI.

Transient UI is usually precipitated by conditions outside the lower urinary tract and accounts for approximately one-third of UI causes among the community-dwelling elderly population and for one-half of causes among acutely hospitalized older patients [15,16,22]. The causes of transient UI can be recalled easily by using the mnemonic DIAPPERS [16]: delirium, infection, atrophic urethritis/vaginitis, psychological disorders, pharmaceuticals, excess urine output, restricted mobility, and stool impaction [15,23]. These eight reversible causes of UI should be assessed for in every elderly person and treated if found. Correction of the underlying causes often results in resolution of the UI [24].

## TYPES OF UI

If UI persists after transient problems have been resolved, causes originating in the lower urinary tract should be considered. Established UI can usually be divided into one of four types: urge UI (DO), stress UI, overflow UI, and functional UI [6].

### 1. Urge UI

Urge UI is characterized by the involuntary loss of urine associated with an abrupt and strong desire to void as a result of DO or increased sensation in the overactive bladder (OAB) [20]. DO is a common cause of UI in elderly persons, accounting for 40% to 70% of causes [6]. Urge UI occurs when the detrusor muscle involuntarily contracts during bladder filling, forcing urine through the urethra [23]. Common causative problems in elderly persons that can lead to urge UI include stroke, Parkinson disease, multiple sclerosis, and various spinal cord disorders [7]. Dementia, such as Alzheimer disease or vascular dementia, can also be associated with urge UI [25,26].

DO in the elderly exists as two physiological subsets: one in which contractile function is preserved and one in which it is impaired [27]. The latter condition is termed detrusor hyperactivity with impaired contractility (DHIC) and is likely the most common form of DO in elderly persons [27].

### 2. Stress UI

Stress UI is the involuntary loss of urine associated with effort or physical exertion. Common provoking activities include coughing, sneezing, lifting, or laughing. All of these physical activities increase intra-abdominal pressure [7]. Stress UI occurs when the total bladder pressure exceeds the urethral closure pressure, often due to either urethral

hypermobility or intrinsic sphincter deficiency [20]. This type of UI is the second most common cause of UI in elderly women. In men, it usually occurs as a result of sphincter damage following radical prostatectomy or transurethral resection of the prostate.

### 3. Overflow UI

Overflow UI is less common than urge UI and occurs when there is incomplete emptying of the bladder during the voiding effort. It is estimated to occur in 7%–11% of older people with UI [6]. Patients with overflow UI usually have symptoms of weak urinary stream, incomplete voiding, and frequent or constant dribbling of urine. Bladder outlet obstruction (BOO) and underactive bladder contractility are the two most common causes of overflow UI [28]. In either case, large bladder volumes lead to an intravesicular pressure that exceeds the limit of intraurethral resistance and eventually leads to leaking or dribbling of urine [6]. In men, benign prostatic hyperplasia can lead to BOO and overflow UI. However, obstruction is rare in women. Overflow UI in women is usually related to detrusor underactivity [23].

### 4. Functional UI

Functional UI is caused by a person's inability or unwillingness to reach toilet facilities in time. This is a different type of geriatric UI and is caused by deficits of cognition and mobility [29]. The cognitive changes can include both delirium and dementia and are frequently associated with loss of mental awareness of the sensation of bladder filling. Patients may also lose the ability to recognize the toilet or lose an understanding of the process needed to adjust clothing in order to void [7]. Some patients simply develop a personal unwillingness to go to the toilet [23].

In most cases, the definition of functional UI implies intact lower urinary tract function. However, this is not always the case in elderly patients. Frail older adults who require assistance with toileting are at an increased risk of functional UI [23,30].

## EVALUATION OF UI

Evaluation of the elderly person with UI includes several important components. Careful evaluation is imperative because therapeutic decisions vary widely depending on the type of UI. The evaluation must begin with a detailed medical history and physical examination, which can provide important information for diagnosis and therapeutic planning [7]. Urinalysis is an essential component of the

evaluation. Most UI cases can be treated based on results of the medical history, physical examination, and urinalysis. Further testing should be based on the findings from this basic evaluation. Additional tests—including urodynamic studies, measurement of PVR, cystoscopy, and imaging of the urinary tract—are sometimes needed [23].

### 1. Medical history

The medical history is the most important part of an evaluation of UI. It is also important to search for transient causes of UI (including over-the-counter medicines) and functional impairment. Determining the duration of UI may be helpful in differentiating between transient and established UI. In addition, the frequency of UI and the amount of leakage should be determined. Some patients experience UI daily, whereas others experience UI only at certain times. The amount of urine loss can range from drops of urine to massive amounts. The timing of leakage is important information that can help to identify the type of UI and possibly the underlying cause [23].

Functional assessment should emphasize both basic and advanced instrumental activities of daily living (BADLs and IADLs). The BADLs consist of self-care tasks, such as bathing, showering, toileting, dressing, eating, and walking. The IADLs, such as shopping, accounting, housekeeping, managing money, taking medicine, and using the telephone, are not necessary for basic functioning, but they allow a person to live independently in a community. The assessment should be performed by using a questionnaire, which can be answered by the patient or caregiver [15].

Patients and caregivers should also be asked about how UI has affected their ability to perform certain activities or to participate in social settings. Many older adults will stop leaving their homes because of problems or fears of UI. This can lead to depression, social isolation, and decreased overall and health-specific quality of life [31,32]. Use of a specific screening tool to check for depression should be considered, such as the Geriatric Depression Scale—a short, validated screening tool for depression in older adults [33].

### 2. Physical examination

A physical examination must be performed in all elderly persons with UI. On abdominal examination, a distended bladder can be identified by palpation. This can help to differentiate overflow UI from other types of UI. A perineal and rectal examination should also be done to detect possible neurological disorders, prostate abnormalities, fecal impaction, or pelvic organ disorder. All sensations and reflexes in this area must be checked, including detailed

testing of anal sphincter and pelvic floor function. A pelvic examination, with use of a speculum or bimanual examination, could be useful for detecting pelvic organ prolapse, such as cystocele, uterine prolapsed, and rectocele. An incompetent urethral sphincter can be assessed for by asking the patient to cough while in a supine position—resulting urine loss suggests sphincter incompetence. This can also be performed in the lithotomy position [6].

### 3. Urinalysis

A complete urinalysis includes both a chemical dipstick analysis of the urine and a microscopic analysis of the urine sediment. The dipstick test is a cost-effective method of screening. Urine cultures and antibiotic susceptibilities should be obtained if the urinalysis shows evidence of a urinary tract infection (UTI) or if the history suggests the possibility of a UTI. Urine microscopic examination is helpful to confirm these findings [23].

### 4. Urodynamic studies

The American Urological Association (AUA)/The Society for Urodynamics and Female Urology (SUFU) Adult Urodynamics Guidelines state, "Clinicians may perform multichannel filling cystometry when it is important to determine if altered compliance, DO or other urodynamic abnormalities are present (or not) in patients with urgency UI in whom invasive, potentially morbid or irreversible treatments are considered" [34]. In addition, the AUA/SUFU Guideline for the Diagnosis and Treatment of Overactive Bladder states, "Urodynamics, cystoscopy and diagnostic renal and bladder ultrasound should not be used in the initial work-up of the uncomplicated patient" [35].

Although urodynamic studies are not required in a routine evaluation of elderly persons, they can be useful when an obvious diagnosis can affect treatment and when initial therapy has failed or other interventions would be tried. Particularly, multichannel urodynamic studies with pressure-flow testing can be useful in differentiating between BOO and poor detrusor contractility with incomplete bladder emptying and overflow UI [15,23,36,37].

### 5. PVR volume measurement

PVR volume can be measured by bladder scan or catheterization. PVR should be measured within 5 minutes after voiding. Although a PVR of zero is ideal, this is not often observed in clinical practice. It is better to check the PVR after an intentional voiding than after a UI episode, because many patients suppress the bladder contraction involuntarily during a UI episode, and more than the true

PVR remains. However, in cognitively impaired patients, this is probably impossible. Although these situations will lead to a falsely elevated PVR, a low volume is still useful. The PVR will also be falsely high if measurement is delayed and the patient suppressed voiding or felt discomfort in the urethra or bladder [15].

### 6. Cystoscopy

Cystoscopy may be considered based on the presenting symptoms associated with UI. It is particularly helpful in patients who have tried other therapies for UI but have not experienced improvement. It is also used to evaluate for hematuria or to identify urethral strictures or other forms of BOO [23].

### 7. Imaging studies

Imaging of the urinary tract may be performed in selected cases, including patients with hematuria or those with unexplained recurrent UTIs. A variety of imaging modalities, including ultrasonography, intravenous pyelography, computed tomography, nuclear renal scanning, and magnetic resonance imaging are available.

## TREATMENT OF UI

On initiating UI treatment in elderly patients, several factors should be considered. The treatment of UI must be individualized in accordance with a diagnostic approach, because several factors outside the genitourinary tract often affect therapeutic efficacy [15]. A patient's associated disease, current drug use, life expectancy, cost of treatment, preferences for care, and goals of care must be considered when choosing therapy, especially in frail elderly patients with UI [38,39]. Treatments for each type of UI are summarized in Table 1.

#### 1. Urge UI

Elderly persons generally prefer to start with conservative therapies before choosing medications or surgery. Many behavioral interventions have been developed to deal with UI. Behavioral therapies are considered as first-line treatment options, especially for elderly persons. Patients with UI often respond to behavioral therapy if they are motivated, well prepared, and cognitively intact [40,41].

Behavioral treatments are a group of therapies that involve changing a patient's behavior or environment. These include toileting programs with scheduled, timed, or prompted voiding and habit or bladder training; caffeine and fluid management; pelvic floor muscle training (PFMT);

**Table 1.** Treatment of geriatric urinary incontinence

Type	Treatment
Urge	<ol style="list-style-type: none"> <li>1. Toileting programs (timed voiding, toilet habit training, and prompted voiding)</li> <li>2. Lifestyle modifications (adequate fluid intake, tapering caffeine, maintaining healthy weight, and regular bowel habits)</li> <li>3. Pelvic floor muscle training and exercise</li> <li>4. Bladder retraining with urge suppression</li> <li>5. Drug therapy (antimuscarinic, beta-3 adrenergic agonist)</li> <li>6. Intravesical injection of botulinum toxin</li> <li>7. Electrical stimulation, neuromodulation</li> </ol>
Stress	<ol style="list-style-type: none"> <li>1. Pelvic floor muscle training and exercise (with biofeedback, weighted vaginal cones)</li> <li>2. Lifestyle modification (adequate fluid intake, stop smoking, diet and medication, maintaining healthy weight, and regular bowel habits)</li> <li>3. Drug therapy (serotonin and norepinephrine reuptake inhibitor)</li> <li>4. Surgery (midurethral sling, injection of periurethral bulking agent, and insertion of an artificial sphincter)</li> </ol>
Overflow	<ol style="list-style-type: none"> <li>1. Drug therapy (<math>\alpha</math>-adrenergic antagonist, anticholinergic, 5 <math>\alpha</math>-reductase inhibitor, cholinergic agent)</li> <li>2. Assistive voiding techniques (double voiding, Credé or Valsalva maneuver)</li> <li>3. Surgery</li> </ol>
Functional	<ol style="list-style-type: none"> <li>1. Toileting programs (prompted voiding)</li> <li>2. Lifestyle modification (adequate fluid intake)</li> <li>3. Management of causative or contributing conditions</li> <li>4. Improvement of mobility</li> </ol>

stress and urge-reduction strategies; nocturia-reduction strategies; constipation management; and functional and environmental changes [35]. Toileting programs, commonly referred to as voiding regimens, include scheduled or timed toileting regimens that most often rely on caregiver involvement or bladder training regimens that require the patient to resist urgency and delay voiding [39].

Timed voiding has also been known as scheduled toileting, routine toileting, and fixed toileting. It provides toileting on a scheduled or fixed time basis, such as every 3–4 hours [42]. The goal of these programs is to empty the bladder on a prescheduled plan before UI occurs. Habit training is a toileting regimen that matches the person's voiding habits or needs based on their voiding pattern [39]. The goal is for the person to follow a planned schedule that is shorter than the person's normal voiding pattern and is timed prior to a possible UI episode [43]. Prompted voiding involves timed or scheduled toileting and promotes toileting behavior. It is used to teach cognitively impaired or intact patients to start their own toileting through requests for help and positive reinforcement from their caregivers when they do so [44]. Toileting programs are often combined with lifestyle modifications—such as maintaining an adequate fluid intake, quitting smoking, tapering caffeine intake, maintaining a healthy weight and regular bowel habits [39]—and are the essence of care for UI in patients with cognitive and mobility impairments [45-47].

PFMT is a mainstay of behavioral intervention for both men and women with UI. Originally, it was designed to teach patients how to control the periurethral muscles

and exercise them daily to increase strength and reduce stress UI. Over time, this intervention has evolved as both a behavior treatment and as physical therapy, combining principles from both fields into a widely accepted non-surgical treatment for stress, urgency, and mixed UI [39]. Although most often applied for stress UI, PFMT has also been recommended for urge UI and OAB by both the European Association of Urology and the AUA [35,48].

Behavior retraining with an urge-suppression strategy is an essential component in teaching patients a new and more adaptive way of responding to the sensation of urgency. The effectiveness of this training for urge UI has been demonstrated in several clinical series. Mean reductions in frequency of UI episodes range from 60% to 80% [49,50].

UI also responds to various pharmaceutical agents. Anticholinergic drugs, which target the muscarinic receptors of bladder smooth muscle, lead to bladder relaxation and inhibit afferent input from the bladder and are the most often prescribed drugs for treating urge UI when conservative therapy is inadequate to control symptoms [7,51]. Commonly used agents include oxybutynin, darifenacin, solifenacin, tolterodine, fesoterodine, and trospium. Adverse effects of antimuscarinic drugs include dry mouth, constipation, blurred vision, confusion, and rarely increased heart rate [52]. These adverse effects can contribute to limited long-term adherence. Discontinuation rates have been reported to be as high as 71% [53]. In a recent systematic review and meta-analysis that assessed adverse event (AE) profiles for antimuscarinic drugs, AEs were similar within transdermal oxybutynin, darifenacin, solifenacin, tolterodine,

fesoterodine, and tropsium. However, oral oxybutynin was associated with a greater number of AEs, such as dry mouth and constipation. The most commonly occurring AE was dry mouth [54]. Irrespective of any antimuscarinic drug used, urinary retention may develop. The PVR and urine output should be monitored and evaluated while patients are taking antimuscarinic drugs, especially patients with DHIC, in whom the detrusor muscle is already compromised [15].

Antimuscarinic agents can precipitate confusion in elderly persons; however, the incidence is rare, and the very low risk of confusion should not preclude the prescription of these drugs in this population, even those who are frail or cognitively impaired. There is also a theoretical concern about using anticholinergic drugs in patients with Alzheimer disease taking a cholinesterase inhibitor, such as donepezil. Central cholinergic stimulation with donepezil is the mainstay of treatment for patients with cognitive impairment [55]. They have opposite effects on both the brain and the bladder. However, the use of anticholinergic drugs along with cholinesterase inhibitors has been reported frequently. Questions remain about the use of this drug in elderly persons [15,56].

A newer drug, mirabegron, which has a selective affinity for  $\beta$ -3 adrenergic receptors, was approved by the US Food and Drug Administration (FDA) as the first agent in this newest category of pharmaceutical treatments for OAB and UI in men and women [57,58]. This drug stimulates the  $\beta$ -3 adrenoceptors (accounts for more than 95% of all  $\beta$ -adrenoceptor mRNA in the human bladder) to relax the detrusor muscle during the storage phase of micturition [59]. In placebo-controlled clinical trials, mirabegron reduced 24-hour urinary frequency and UI episodes. Mirabegron was found to slightly increase the heart rate and blood pressure in clinical trials; greater increases were seen with higher doses [39]. This drug might be a reasonable choice for frail patients with dementia, but experience with this new class of agents in frail older persons is limited.

Desmopressin (exogenous arginine vasopressin), which is a synthetic antidiuretic hormone that has no effect on blood pressure, can be helpful in elderly patients with nocturia or nocturnal polyuria [60]. Recent studies have shown that desmopressin is relatively safe for elderly persons [61]. However, there is little reliable evidence to support a reduction in UI episodes with desmopressin in elderly patients. Therefore, desmopressin must be used with great caution among elderly persons with urge UI [15].

Intravesicular injection of botulinum toxin was recently approved by the FDA for use in both neurogenic and nonneurogenic types of urge UI [62]. The most commonly

used agent is onabotulinumtoxinA (Botox), which acts as a pharmacological neuromodulator. This potent neurotoxic protein inhibits the presynaptic release of acetylcholine from efferent nerves [63] and may inhibit sensory pathways [64] in the detrusor muscle. These changes inhibit detrusor contractions and help to reduce urge UI. Neuromodulation modalities, including sacral neuromodulation and posterior tibial nerve stimulation, are currently approved minimally invasive treatments. Overall, for elderly persons with refractory urge UI, sacral neuromodulation and posterior tibial nerve stimulation are viable options and could prove successful in selected cases.

Insertion of an indwelling urethral catheter is not recommended for the treatment of urge UI alone, because it may aggravate symptoms. If used, a urethral catheter with a narrow lumen and small balloon is recommended to prevent urine leakage around the catheter. Such leakage results from bladder spasms, which can be decreased by using the smallest balloon available. Increasing the lumen and balloon size of the catheter only exacerbates the problem and may result in urethral erosion and sphincter incompetence [15]. If bypassing persists, anticholinergic drugs can be tried. External condom catheters are useful for men, but problems include skin erosion, bacteriuria, and decreased motivation to become continent.

## 2. Stress UI

The goal of PFMT for stress UI is to teach patients to occlude the urethra by consciously contracting the PFMs during coughing, sneezing, lifting, standing, or any other physical activity that causes urine leakage. PFMT can decrease UI significantly in elderly women who are motivated, cognitively intact, and trained to perform the exercise several times a day [65,66]. It is important that patients learn how to perform the PFMT properly. Several techniques can be used to help patients learn to exercise correctly, including verbal feedback based on vaginal or anal palpation, biofeedback, and electrical stimulation [39,49,67]. Unfortunately, PFMT must be performed continually and its efficacy is limited for severe UI—only 10%–25% of women become completely dry, and many elderly women are unable or unmotivated to continue such exercise programs [66,68].

Effective and well-tolerated pharmacological treatments for stress UI in older women remains indefinitely. Duloxetine, a serotonin and norepinephrine reuptake inhibitor, has been evaluated in several randomized controlled trials, and a recent systematic review suggests that it may be beneficial for the treatment of mild stress UI in women

[69]. However, many of the nonsurgical treatments have low success rates, particularly in the elderly [70].

Although stress UI can be managed through nonsurgical and surgical treatment, the only long-term curative treatment is surgery. When considering surgical therapy for stress UI, a patient's age should not be the primary determining factor. More important is the patient's overall health or frailty [7,71]. Midurethral slings have become the most frequently performed treatment for stress UI, and the success rates of these procedures at 1-year range from 77% to 90%, according to the definition of success [71]. However, the success rates of tension-free vaginal tape are lower in elderly persons, who tend to reflect the higher prevalence of DO, intrinsic sphincter deficiency, decreased detrusor contractility, other comorbidities, and previous surgeries [72-75]. Nevertheless, 80%–96% of elderly women were cured within the first year after surgery, decreasing to 60%–70% at 2–3 years. The long-term cure rate, 5 years after the insertion of tension-free vaginal tape, was 55% in 113 women  $\geq 75$  years of age [75]. Complication rates, including persistent urinary retention and voiding symptoms, generally ranged from 2% to 15%, whereas *de novo* urgency (or DO) was somewhat more common [76]. The injection of periurethral bulking agents and insertion of an artificial sphincter may be helpful in patients who have sphincter incompetence [77].

### 3. Overflow UI

Overflow UI occurs as a result of poor bladder emptying. Therefore, the goal of treatment is the complete emptying of the bladder. This may require the use of either medications or surgery. Sudden onset of overflow UI is sometimes caused by a new drug, anesthesia, or surgery. In such patients, improvement often occurs after bladder drainage for a few days, if bladder function returns to normal quickly [39].

Alpha-adrenergic antagonists such as terazosin, doxazosin, alfuzosin, tamsulosin, and silodosin are useful and generally well tolerated. These agents must be used cautiously in older patients because of their tendency to cause orthostatic hypotension. Patients using a selective  $\alpha$ -adrenergic antagonist may have less risk of orthostatic hypotension compared with nonselective drugs in older patients [78].

Anticholinergic medicines can be effective and safe for patients with BOO and DO who have not responded well to an  $\alpha$ -adrenergic antagonist alone, although the effect on UI has generally not been proven [79,80]. Special attention should be given to patients taking other anticholinergic agents, with any degree of cognitive impairment, with a PVR greater than 150 mL, and in whom close follow-up is impossible [15].

5 $\alpha$ -Reductase inhibitors (finasteride or dutasteride) may decrease the size of the prostate in some patients, so that urinary flow will improve, although an immediate effect is not expected. They also reduce the risk of urinary retention, although this manifests at least 1 year later. Their efficacy in the treatment of UI is unclear [15].

The cholinergic agent bethanechol could be useful in patients with overflow UI if the bladder contracts weakly due to an anticholinergic agent, which cannot be discontinued. In addition, bethanechol may decrease the PVR if sphincter function and local innervation are intact [81]. However, little evidence suggests that long-term success can be expected. Postoperative patients are the most likely to benefit from short-term use of this medicine.

Patients with overflow UI also can facilitate bladder emptying with several voiding techniques, such as double voiding, the Credé maneuver, and the Valsalva maneuver. If the detrusor remains acontractile after decompression, these techniques tend to be unsuccessful, and intermittent catheterization or an indwelling urethral catheter should be used [15].

### 4. Functional UI

Treatment of functional UI depends on the successful management of causative or contributing conditions. Improvement in initiative and mobility for toileting may well lead to a reduction in UI [55]. Mobility can be improved by relieving pain and providing equipment for patients with arthritis, contractures, and neurological disorders. Environmental modifications also can be useful in select patients [6].

## CONCLUSIONS

Urologists are expected to encounter increasing numbers of elderly patients with lower urinary tract dysfunction. UI is the most common problem in the elderly population. Although most patients with UI can benefit from a diagnostic approach and therapeutic management, most do not seek medical evaluation. There are different types of UI in the elderly. UI is usually treatable and often curable at all ages, but the best approach in the elderly population differs significantly from that in younger patients. With use of a combination of behavioral, pharmacological, and surgical treatments, most patients will experience considerable improvement in or possibly a cure for UI. Further research is needed to fully understand the pathophysiology of geriatric lower urinary tract dysfunction.

## CONFLICTS OF INTEREST

The authors have nothing to disclose.

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