

REVIEW ARTICLE

Urinary Incontinence in the Elderly

Part 3 of a Series of Articles on Incontinence

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SUMMARY

Background: Urinary incontinence is a common and distressing complaint in the elderly. Its causes include structural changes in vesical muscle as well as impaired neural control and age-related changes of the lower urinary tract. Incontinence can also be a side effect of medication.

Methods: The PubMed database was selectively searched for publications containing the terms “urinary incontinence” and “elderly.” Studies with a high level of evidence were chosen as the main basis for this review.

Results: The individualized diagnostic evaluation of the incontinent elderly patient should generally be non-invasive. The evaluation may reveal urinary incontinence of several different types: stress incontinence, overactive bladder, and mixed incontinence. The treatment generally involves medication, such as anti-muscarinic agents, alpha-receptor blockers, and/or serotonin/noradrenalin reuptake inhibitors, combined with modifications of personal behavior, such as bladder training, altered fluid intake, and pelvic floor contraction. A number of minimally invasive surgical techniques can be useful for patients in operable condition, whenever such an operation seems reasonable in view of the patient's overall situation.

Conclusion: Urinary incontinence in the elderly can be readily evaluated, and the currently available forms of treatment often bring satisfactory relief with an economical use of medical resources and with little or no additional discomfort for the patient.

Urinary incontinence in the elderly is becoming an increasing medical and socioeconomic problem. The reasons are demographic trends and an increase in the number of patients with chronic diseases such as diabetes, Parkinson's disease, and dementias (such as Alzheimer's disease). People affected by urinary incontinence carry a vast psychological burden, and the demands on those around them constitute a social problem as well as a care problem. Of the people living with urinary incontinence who require treatment or care in Germany, more than 2 million are older than 60 years (11% of this age group), in those older than 80, almost 30% are affected (1). In adults, the estimated prevalence of urinary tract symptoms is 17%, and in people older than 80, more than 75% (2).

In old age, almost as many men as women are affected by urinary urge symptoms (“overactive bladder”, OAB). Urge incontinence vitally affects people's quality of life (and can result, for example, in depression, falls, skin complications, social isolation, hospital admissions, or admissions to nursing homes) and people's mortality (3). Recent insights, especially into central bladder control and into the storage and micturition function of the bladder create a rather more complex picture of incontinence in the elderly, compared with only a few years ago. People with impaired bladder function who are up to 65 years old usually have functional defects of the bladder, bladder outlet, or pelvic floor, whereas the capacity to remain continent in old age is mainly influenced by changed neurogenic control and weakening compensatory mechanisms (4).

This review article is based, on the one hand, on the specialty experiences of the different authors and, on the other hand, on a structured literature search of the PubMed database, using the search terms “urinary incontinence” and “elderly”.

In this article, we provide an overview of the frequency, causes, types, investigative techniques, and treatment strategies for urinary incontinence in the elderly.

Pathogenesis

Overactive bladder

An overactive bladder is common in elderly people and is characterized by the symptoms of immediate urinary urgency, pollakisuria, and, in case of involuntary urinary loss, also by urge incontinence. The presumed

Cite this as: *Dtsch Arztebl Int* 2010; 107(30): 531–6
DOI: 10.3238/arztebl.2010.0531

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BOX 1

Non-invasive diagnostic evaluation in elderly people with urinary incontinence

- Medical history
- Physical examination
- Rapid urine testing
- Drinking and micturition diary (if possible for 2 days and 2 nights)
- Pad weighing test
- Measurement of residual urine

BOX 2

Further diagnostic evaluation in elderly people with urinary incontinence

- Uroflowmetry
- Ultrasonography of the urinary tract
- Perineal and introitus ultrasonography
- Urethrocystoscopy
- Gynecological examination and calibration of the urethra
- Urodynamic examination
- Micturition-cysto-urethrogram (MCU) or urodynamic examination by video

causes for such impaired bladder function include involuntary detrusor contractions that are mediated by the muscarinic receptors, which can be urodynamically confirmed even during the filling phase. Structural changes to the bladder with a loss of detrusor elasticity are caused by collagenic restructuring (5–8). The detrusor muscle undergoes an aging process of its own.

Stress incontinence

Stress incontinence results from an insufficient sphincter mechanism at the bladder outlet. The diagnosis is confirmed by involuntary urinary loss as a result of a passive increase in intravesical pressure owing to physical stimuli such as coughing, sneezing, or crunching the abdominal muscles in the absence of detrusor contractions on urodynamic testing.

In everyday clinical practice, symptoms of urge and stress incontinence are often observed as a combination—so-called mixed incontinence.

Diabetes

Diabetes is associated with an increased risk of developing urinary incontinence. The prevalence of diabetes has risen in recent years. In the industrialized world, almost 25% of people older than 75 are now affected (9). The risk increases in tandem with the number of years a patient has had diabetes, and the risk of severe incontinence symptoms is almost twice as high as in subjects without type 2 diabetes (10). Urodynamic investigations in elderly people with type 2 diabetes have shown pathological findings in 79% of men and 59% of women (reduced sensory reflexes, detrusor hypercontractibility, residual urine, increased bladder capacity) (11). In addition to the central and peripheral polyneuropathic changes, different diabetes-related functional impairments take effect in the development of urinary incontinence:

- Changed sensory reflex owing to polyneuropathy
- Reduced mobility owing to diabetic foot
- Impaired vision owing to diabetic retinopathy
- Changes to fluid intake owing to diabetogenic nephropathy.

Diagnostic evaluation

In most elderly people with incontinence, non-invasive diagnostic evaluation can be used to reach a diagnosis if an underlying functional impairment is suspected, and conservative therapeutic approaches can be deployed. On the basis of a detailed medical history, a fluid intake and micturition diary that is kept for two days (if possible accompanied by weighing tests for the incontinence pads), clinical examination, urine (rapid test) diagnostic evaluation, and measuring of residual urine after intentional micturition, possibly impaired bladder function can be assessed. The extent of the primary examination should be adapted to the individual patient's requirements and needs.

If the described diagnostic evaluation does not enable a conclusive assessment of the situation, or if conservative treatment has failed, more extensive diagnostic tests should be conducted as long as this is tolerable for the patient and as long as a positive therapeutic approach is expected. Uroflowmetry with subsequent measuring of residual urine allows conclusions about the underlying malfunction. Perineal sonographic and endoscopic examinations of the lower urinary tract and a gynecological examination in women constitute the next step on the diagnostic ladder. Urodynamic examination is always required if it might influence the patient's treatment, if primary treatment has remained unsuccessful, or if a surgical procedure is planned (Box 1, 2).

Therapeutic options

Pelvic floor exercises, bladder management

Physical measures and behavioral interventions are important in elderly patients, in addition to medication treatment that takes into account risks and side effects.

A Cochrane Review of 13 randomized studies including 714 women investigated the value of pelvic

floor exercises versus placebo in women with stress incontinence. The probability of regaining continence was increased 17-fold in the group doing the exercises, a statistically significant increase (12) (evidence level 1A).

Bladder management includes micturition and toilet training as well as pelvic floor exercises. Toilet training and pelvic floor training are of particular importance in incontinence in the elderly. These therapeutic measures need to be individually tailored, however, taking into account patients' mobility, motivation, and cognitive competence. The greatest successes have been achieved by means of professional care and therapeutic instruction. A combination of drug therapy and behavioral therapy should always be considered. Active measures such as functional pelvic floor exercises are supported by passive treatments, such as electrotherapy. Cognitive approaches in the sense of a conditioning of behaviors and delaying strategies further complement the therapeutic approach. Relaxation techniques can also help reduce urinary urgency.

Magnetic stimulation treatment can be a useful addition to pelvic floor exercises as well as bladder training in elderly patients.

Medication treatment

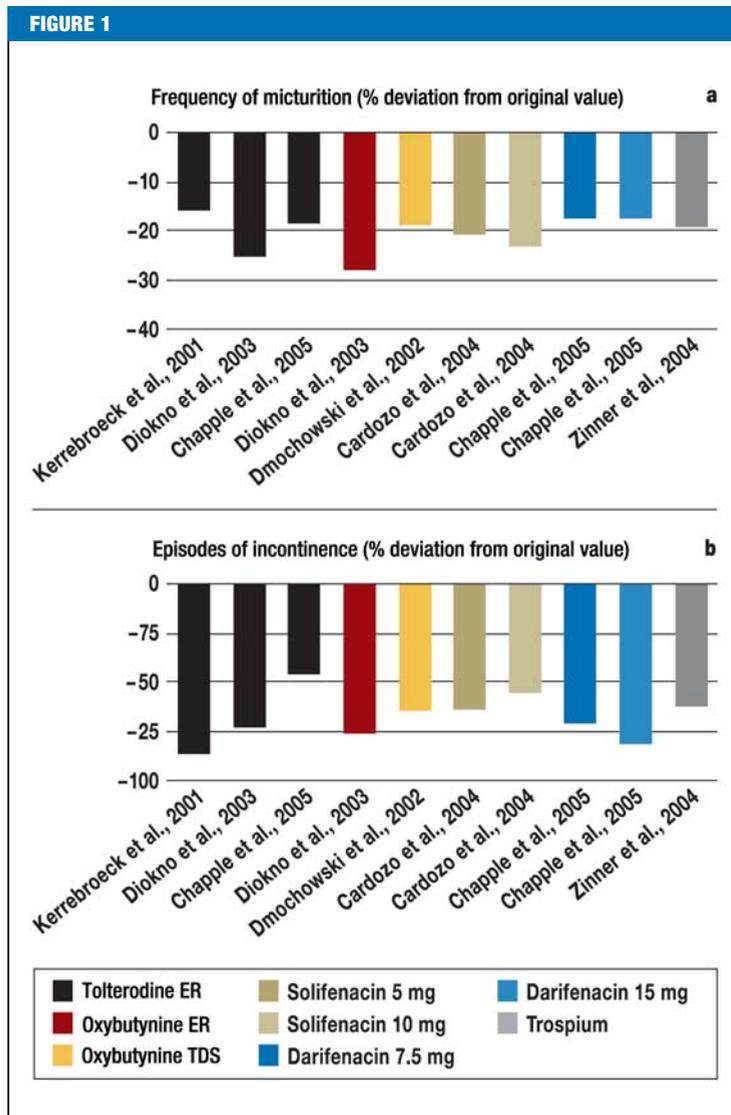
Changes to the acetylcholine metabolism pose a therapeutic obstacle to medication treatment for the overactive bladder in elderly patients. Central cholinergic transmitter systems connect the cerebral cortex as an information store with the hippocampus (the primary region for learning and memory storage) (13). Comparing age dependent muscarinic receptor binding in the brain between the bilateral frontal cortex and the cerebellum has shown an age dependent decrease of about 8% per decade (14). Patients with Alzheimer's disease and other dementias, Parkinson's disease, type 2 diabetes in adults, multiple sclerosis, and chronic alcoholism are at an age independent increased risk for cognitive impairments.

Anticholinergics

In Germany different anticholinergic drugs are available to treat urge incontinence or symptoms of urinary urgency, whose selectivity profiles are partly different. In vitro data have shown that propiverine, tolterodine, fesoterodine, and trospium chloride all have a clear affinity for all muscarinic receptor types. Darifenacin and solifenacin are relatively selective for M3 receptors. All available substances are significantly effective against the main symptoms of an overactive bladder and urge incontinence (evidence level 1A).

The decisive element in terms of neurological side effects, apart from passing the blood-brain barrier, is the relative affinity of anticholinergics for the M1 receptor, while blocking the M3 receptors in the smooth detrusor muscles is a vital prerequisite for clinical effectiveness.

The specific effect of the different anticholinergic substances on elderly patients' cognitive functioning



Main effects of licensed anticholinergic substances, shown by respective licensing study

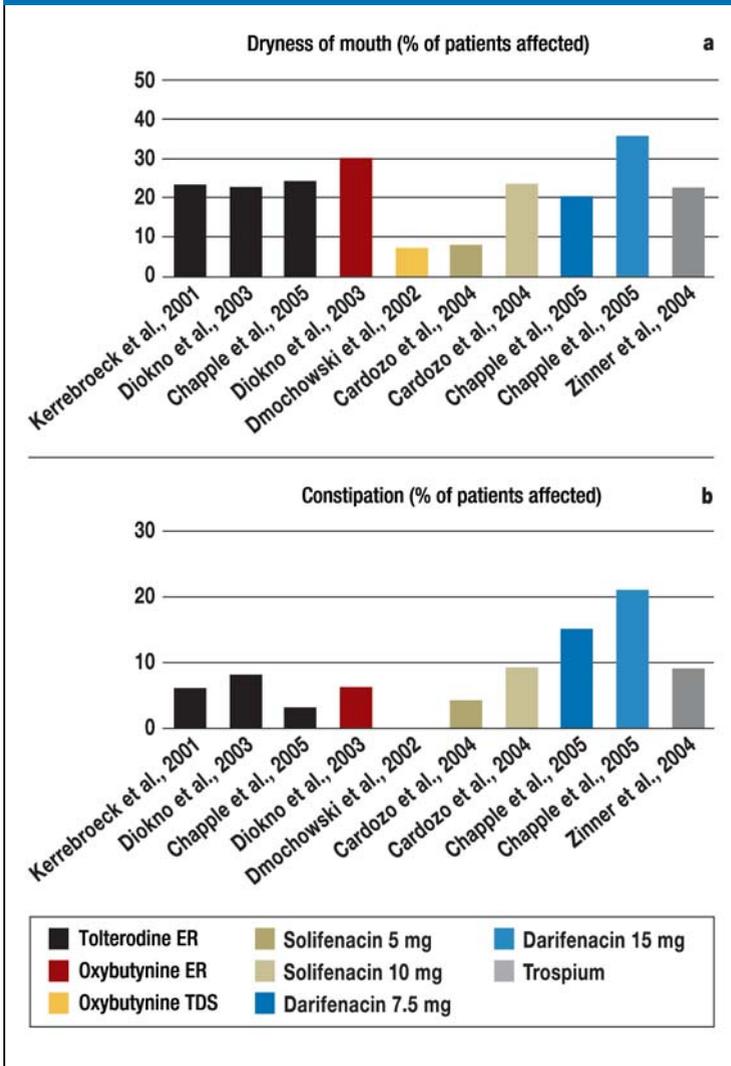
a) Frequency of micturition, b) Frequency of incontinence episodes.

From: Goepel M, Steinwachs KC: Wie beeinflussen Medikamente zur Therapie der Harninkontinenz die Gehirnfunktion beim älteren Menschen, *Der Urologe A* 2007; 46 (4): 387–92. With permission from Springer.

ER = extended release; TDS = transdermal delivery system

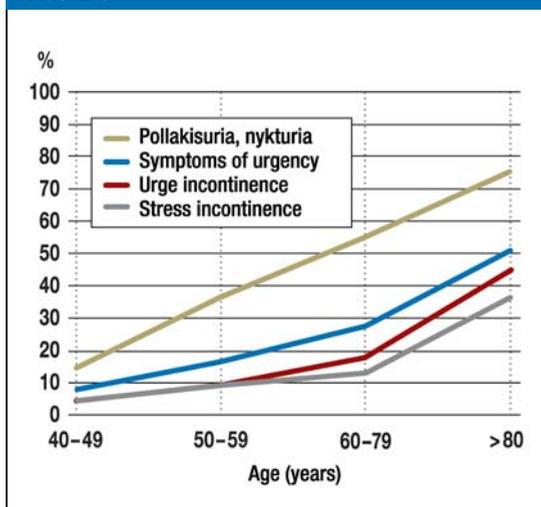
has been investigated for some substances. Parameters such as word recognition and memory were investigated, as were general reaction times. The end points relating to cognitive functioning for darifenacin and placebo did not reach significance (16) (evidence level 2A). The results of a comparative study pitting darifenacin against extended release oxybutynine showed similar results (17) (evidence level 2A). Similarly, the tests used showed no measurable changes for tolterodine when extended release oxybutynine was compared with extended release oxybutynine (18) (evidence level 2A). For trospium chloride, studies have compared the substance with oxybutynine 20 mg by

FIGURE 2



Prevalence of urinary tract symptoms in the general population relative to people's age, modified from (2)

FIGURE 3



Side effects of licensed anticholinergic substances,

shown by respective licensing study

- a) Dryness of mouth,
- b) Constipation.

From: Goepel M, Steinwachs KC: Wie beeinflussen Medikamente zur Therapie der Harninkontinenz die Gehirnfunktion beim älteren Menschen, *Der Urologe A* 2007; 46 (4): 387-92. With permission from Springer.

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means of the multichannel electroencephalogram (EEG). No significant changes to the EEG were found after administration of trospium chloride (19) (evidence level 2B) (Figures 1, 2, 3) (Box 3).

Comedications with anticholinergic or adverse effects

The typical elderly patient with urinary incontinence is often also receiving medication for other comorbidities. For this reason, before treatment for urge incontinence or symptoms of urinary urgency is taken up, the medication that the patient is already receiving should be reviewed for anticholinergic side effects and the planned treatment for urge incontinence adjusted if necessary (Box 4, adapted from [20]). Commonly prescribed pharmaceuticals with anticholinergic effects include furosemide/frusemide, digoxin, theophylline, nifedipine, prednisolone, and cimetidine (Box 4).

Duloxetine

Duloxetine has been licensed for the drug treatment of stress incontinence in women. The efficacy and tolerability of duloxetine in stress incontinence was documented in 4 randomized, placebo controlled, double blind, phase 2 and phase 3 studies that included more than 1900 patients (21) (evidence level 2A). Daily intake of duloxetine 2x40 mg lowered the number of episodes of incontinence significantly, by more than 50%. The mechanism of action is based on stimulation of motor neurons of the pudendal nerve, which originate in the sacral Onuf's nucleus. Duloxetine strengthens sphincter contractility without impairing the coordinated function of bladder and urethra. The main side effect was nausea, which affected some 25% of patients in the study. Stepping up the dosage over time is intended to counteract the nausea. In elderly patients, duloxetine is rarely prescribed. Although duloxetine has regularly shown efficacy in incontinence after prostatectomy in men, a relevant licensing study is currently lacking.

Surgical treatment

An indication for surgery exists in elderly people with an incompetent vesical sphincter if they are generally able to have surgery and if conservative therapeutic measures have failed.

BOX 3

Meta-analysis of anticholinergics*¹

- Based on 83 studies from 1118 publications
- All anticholinergics are significantly efficacious compared with placebo
- None of the preparations caused severe side effects
- Most common side effects:
 - Dryness of mouth 29.6%
 - Pruritus 15.5%
 - Constipation (M3)
- Significant improvement in health related quality of life (“relative health related quality of life”)
 - Darifenacin
 - Fesoterodine
 - Transdermal oxybutynine
 - Propiverine (extended release)
 - Solifenacin
 - Tolterodine immediate release (IR) and extended release (ER)
 - Trospium

*¹ Modified from (15)

BOX 4

Commonly prescribed anticholinergic substances*¹

- **Anticholinergics**
 - Antiemetics/antivertigo drugs
 - Anti-Parkinson
 - Spasmolytics (gastrointestinal tract)
 - Spasmolytics (urogenital tract)
 - Migraine medication
 - Bronchodilators
 - Preanesthetics
 - Mydriatic drugs
- **Medications with anticholinergic side effects**
 - Antiarrhythmic agents
 - Antidiarrheal drugs
 - Antihistamines
 - Muscle relaxants
 - Medication for ulcers
 - Antidepressants
 - Antipsychotic drugs
 - Herbal preparations

*¹ modified from (20)

Prostate treatment

Transurethral resection of the prostate (TURP) is a safe and successful intervention to reduce symptoms of urinary incontinence in patients with age-related benign prostatic enlargement (BPE) and lower urinary tract symptoms (LUTS), in whom drug treatment has not been sufficiently effective (alpha-receptor blockers, antimuscarinic drugs, 5-alpha reductase inhibitors). Numerous minimally invasive alternative techniques are at the surgeon’s disposal, which also bring about a significant reduction in symptoms (transurethral microwave thermotherapy [TUMT], transurethral needle ablation [TUNA], laser approaches). The choice of surgical methods in individual elderly patients, and the decision whether the treatment of last resort should be urine drainage techniques (permanent catheter, intra-prostatic stents) depends on the general condition of the patient and his comorbidities.

Depot injections

In elderly female patients, periurethral collagen injections have been studied. 10 months postoperatively, 83% of patients were still cured of their symptoms, but afterwards the success rate dropped rapidly to 20% in parallel to the increasing time interval since the procedure. Further, de-novo detrusor instabilities affected 40% of patients (21) (evidence level 3).

Open or laparoscopic colposuspension

In some 60% of elderly female patients, colposuspension can safely be recommended on the basis of their general condition. 75% of patients were cured (22)

(evidence level 3). Laparoscopic approaches have become equally effective as open procedures but impose less of a burden on the patient.

Slingsuspension of the urethra (TVT/TOT)

The tension free vaginal tape (TVT) described by Ulmsten and the resulting developments such as transobturator tape (TOT) are minimally invasive therapeutic approaches in women with stress incontinence and can be used in elderly patients. Long-term results of the TVT method over 11 years have shown a persistent continence rate of more than 80%; this method is thus equal to open Burch colposuspension (23) (evidence level 2A). Complications are rare (TVT, bladder perforation; TOT, pain in the thigh).

Conclusion

Urinary incontinence as a symptom of impaired bladder function is common in elderly people and poses a heavy burden on patients and their social environment. Non-invasive diagnostic evaluation can provide initial pointers as to which treatment may be indicated. Severe cases and those that are refractory to treatment will have to be examined invasively if a stringent approach is taken. Surgical intervention in elderly patients will have to be considered if a patient’s general condition is such that they can tolerate surgery, if a patient has stress incontinence or mixed incontinence with a high proportion of stress incontinence, and if conservative therapeutic approaches have reduced symptoms to an insufficient extent. The treatment of the symptomatic overactive bladder in elderly patients consists of

administering anticholinergics. The available substances differ with regard to their affinity for the muscarinic receptors M1 to M5 in terms of their pharmacokinetic and pharmacodynamic properties, but they are comparable with regard to their main effects and primary side effect profile. If a relevant comorbidity is present or the patient is simultaneously taking other drugs with anticholinergic effects, however, substances without or with very slight central side effects should be preferred.

Conflict of interest statement

The authors declare that no conflict of interest exists according to the guidelines of the International Committee of Medical Journal Editors.

Manuscript received on 23 December 2008, revised version accepted on 2 November 2009.

Translated from the original German by Dr Birte Twisselmann.

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