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Review - Neuro-urology – Voiding Dysfunction

A Shifted Paradigm for the Further Understanding, Evaluation, and Treatment of Lower Urinary Tract Symptoms in Men: Focus on the Bladder

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Abstract

Lower urinary tract symptoms (LUTS) are highly prevalent among older men and have a negative impact on health-related quality of life. Frequent comorbidity with potential prostatic disease adds complexity to the management of male LUTS. In this review, we discuss the pathophysiological conditions that underlie male LUTS, and examine the relationship between symptoms and urodynamic findings. The contribution of bladder dysfunction to male LUTS, with a particular emphasis on overactive bladder (OAB) symptoms, is explored. We also consider pharmacotherapeutic options for male LUTS. Pharmacotherapies that target the prostate (α_1-receptor antagonists and 5α-reductase inhibitors) often fail to alleviate OAB symptoms, and may not be the most appropriate therapy for men with storage LUTS. Multiple studies have suggested that antimuscarinic therapy alone or in combination with α_1-receptor antagonists improve OAB symptoms in men with and without bladder outlet obstruction. Although these agents may represent appropriate first-line therapies for men with OAB symptoms, the therapeutic potential of antimuscarinics alone or in combination with α_1-receptor antagonists in this population should be evaluated in large-scale, well-designed clinical trials.

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1. Introduction

Lower urinary tract symptoms (LUTS) are associated with great emotional costs [1] to individuals and substantial economic costs to society [2]. The prevalence and severity of LUTS increase with age [3], and the progressive growth of the aged population group has broadened the societal impact of LUTS.

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LUTS comprise storage symptoms (daytime urinary frequency, nocturia, urgency, urinary incontinence), voiding symptoms (slow stream, splitting or spraying, intermittency, hesitancy, straining, terminal dribble), and postmicturition symptoms (sensation of incomplete emptying, postmicturition dribble) [4]. A large-scale multinational study revealed that 90% of men aged 50 to 80 suffer from potentially troublesome LUTS [3]. Questionnaire data from 1,271 men with LUTS indicated that many men have storage and voiding symptoms [5]. The same study demonstrated that voiding symptoms were the most common male LUTS, but that storage symptoms made up four of the five most bothersome LUTS. Although LUTS are also highly prevalent in women, their frequent comorbidity with prostatic disease in men adds complexity to the management of male LUTS.

This review focuses on a number of contemporary issues that relate to the management of male LUTS. First, we discuss the appropriate terminology for categorizing the pathophysiological conditions underlying male LUTS. Second, we review the relationship between symptoms and urodynamic findings. The relative contribution of bladder dysfunction to male LUTS, with a particular emphasis on the subset of storage symptoms that characterize overactive bladder (OAB) syndrome, is explored. Finally, we consider pharmacotherapeutic options for male LUTS, with particular attention to male OAB symptoms. We emphasize the need for large, placebo-controlled trials to investigate the efficacy and safety of antimuscarinics for the treatment of OAB in men, when used alone or in combination with α_1-receptor antagonists.

2. LUTS terminology

Historically, a number of terms such as prostatism, symptoms of benign prostatic hyperplasia (BPH), and clinical BPH have been used to describe male LUTS. However, we recommend that these pseudodiagnostic terms be eliminated from the medical vocabulary because not all male storage and voiding symptoms are prostate related [6,7]. In fact, relationships between voiding symptoms and urodynamic markers of prostatic conditions are weak [8]. Thus, Abrams [7] and Holtgrewe [6] recommended the use of the term *LUTS*. The term *BPH* should be reserved for histopathologically confirmed hyperplastic changes in the prostate [4]. Berry et al. [9] combined the results of five major studies and reported that the prevalence of histologically confirmed BPH at autopsy increased from 42% in men aged 50 to 59 to 88% in men older than 80. BPH is often associated with LUTS, but LUTS generally cannot be used to make a definitive diagnosis of BPH [4]. Extraprostatic conditions associated with LUTS include bladder dysfunction, psychogenic disorders, congestive heart failure, and polypharmacy [10]. Only 25%–50% of men with histologically confirmed BPH have LUTS [11].

Benign prostatic enlargement (BPE) is caused by BPH. The term *prostatic enlargement* should be used when BPH has not been histologically confirmed [4]. Only about half of men with BPH will develop BPE [12]. BPE may cause bladder outlet obstruction (BOO), which is characterized by increased detrusor pressure and reduced urine flow rate. BOO is diagnosed using simultaneous measurements of flow rate and detrusor pressure obtained during urodynamic pressure-flow studies that use criteria defined by the International Continence Society [4]. BOO caused by BPE has both static (increased tissue mass) and dynamic (increased smooth muscle tone) components in the prostate [11], which represent independent targets for pharmacotherapy.

LUTS, when suggestive of BOO, is ''a term used when a man complains predominantly of voiding symptoms in the absence of infection or obvious pathology other than possible causes of outlet obstruction'' [4]. This term should be used until pressure-flow studies have confirmed the presence of BOO, because many men with LUTS do not have BOO. In a study based in the United Kingdom and Italy, Laniado et al. [13] reported urodynamically confirmed BOO in only 48% of referred men with LUTS. Furthermore, in a study of 565 men with LUTS, pressure-flow studies revealed that 301 (53%) had BOO [14]. However, LUTS that are suggestive of BOO may be caused by a poorly functioning detrusor instead of prostatic pathology [15].

In summary, LUTS may result from a complex interplay of pathophysiological influences, including prostatic pathology and bladder dysfunction. LUTS include all storage and voiding symptoms, and the term *LUTS* should be used in place of terms like *BPH* or *BOO* unless the latter conditions have been confirmed by histology or urodynamics, respectively. OAB symptoms form a subset of storage LUTS (urgency, frequency, urgency urinary incontinence [UUI], and nocturia). The use of incorrect and inconsistent terminology may lead to confusion among clinicians and patients and mismanagement of the conditions that underlie male LUTS.

3. Overactive bladder

OAB is characterized by urinary urgency, with or without UUI, usually with frequency and nocturia

[4]. Thus, OAB comprises the same symptoms as storage LUTS, and excludes types of incontinence other than UUI. OAB affects approximately 16% of men and women in the United States [16] and Europe [17]. It is similar to LUTS, and its prevalence increases with age [16–18]. Milsom et al. [17] reported that the prevalence of OAB increased from 3% in men aged 40 to 44 to 42% in those older than 75. Unlike most women with OAB, most men with OAB do not experience incontinence (55% versus 16%, respectively) [16,18].

OAB is bothersome and has negative effects on health-related quality of life [16,18]. Ninety-two percent of men with at least 9 micturitions/day reported that frequency was at least ''a bit of a problem'' [19]. Peters et al. [5] reported that at least 80% of men with urinary urgency and/or UUI and 64% of those with nocturia reported some degree of bother associated with these symptoms.

Male OAB symptoms are often caused by bladder dysfunctions such as detrusor overactivity (DO) and impaired detrusor contractility, BOO, or a combination of bladder dysfunction and BOO [20]. DO is a frequent cause of OAB symptoms and is urodynamically characterized by involuntary detrusor contractions during the bladder filling phase [4]. DO and BOO often occur together. In one study, 45% of 162 men with LUTS had both BOO and DO [21]. Two independent studies reported that nearly 50% of men with LUTS and urodynamically confirmed BOO had DO [22,23]. Similarly, Hyman et al. [24] confirmed DO in 50 (46%) of 109 men with OAB symptoms and BOO.

BOO may cause DO via cholinergic denervation of the detrusor and consequent supersensitivity of muscarinic receptors to acetylcholine [25]. Increased bladder outlet resistance may also result in ischemia, increased detrusor collagen content, changes in electrical properties of detrusor smooth muscle cells [15], and reorganization of the spinal micturition reflex [26], all of which are associated with the development of DO in animal models. However, comorbid BOO and DO are not always evidence of a cause-and-effect relationship between these two conditions.

OAB symptoms can be caused solely by bladder dysfunction that is independent of prostatic pathology. The observation that many men with OAB symptoms do not have BOO [24] underscores the potential role of bladder dysfunction. The fact that OAB symptoms are not limited to men provides further support for this assertion, bearing in mind that female BOO is extremely uncommon.

OAB is reasonably well correlated with DO; however, voiding symptoms correlate poorly with BOO. Therefore, scores on the storage and voiding subscales of the American Urological Association (AUA) symptom index did not differ significantly between men and women aged 55–79 who attended a health fair in Milwaukee [27]. A study of more than 4,000 Japanese men and women at least 40 revealed higher International Prostate Symptom Scores (IPSS) for voiding symptoms in men, but comparable storage symptom scores between men and women [28]. Romanzi et al. [29] evaluated men and women with persistent storage symptoms and reported that 89% of patients whose primary symptoms were frequency and urgency had urodynamically confirmed DO. In patients with Parkinson's disease and LUTS, storage symptoms that were determined by the IPSS demonstrated significant negative correlations with volume at first desire to void and maximum bladder capacity and significant positive correlations with uninhibited bladder contractions during the storage phase [30]. Furthermore, Barry et al. [31] reported that symptoms of frequency, urgency, and nocturia were not significantly correlated with mean flow rate, peak flow rate (Q_{max}), postvoid residual volume (PVR), prostate size, or levels of prostate-specific antigen among 198 participants in the BPH Treatment Outcomes Pilot Study. Finally, urgency, UUI, frequency, and nocturia were not significantly correlated with Q_{max}, urethral resistance, or prostate size in 107 men with LUTS that are suggestive of BPH. However, all four OAB symptoms were significantly correlated with cystometrically diagnosed DO [32].

Symptom scores and urodynamic studies should be considered separately in the evaluation of men with LUTS [33]. There is a weak correlation between symptoms (especially voiding symptoms) and BOO, and no clinical or investigative features correlated well with BOO demonstrated in pressure flow studies [8]. However, a combination of symptomatic and urodynamic assessments is helpful. More positive outcomes are associated with severe symptoms and low flow rates ($<$10 ml/s). Although it is commonly used, uroflowmetry in general, and Q_{max} in particular, lack specificity for a reliable urodynamic diagnosis of the cause of LUTS [8]. Elevated PVR is associated with BOO, but the relationship is not strong. Approximately 50% of unobstructed elderly men have elevated PVR, and 30% of obstructed men do not. Pressure flow studies have shown a clear association between classical obstruction (high pressure/low flow) and more positive surgical outcomes [8].

Clearly, urodynamically confirmed BOO and voiding symptoms are more predictive of positive outcomes of transurethral resection of the prostate

(TURP) than are DO and storage symptoms. Machino et al. [34] reported significantly greater symptomatic improvements after TURP in men who had preoperative DO and BOO than in those with DO without definitive obstruction. These authors also reported that 60% of men with DO and equivocal obstruction had persistent postoperative DO, compared with 27% of those in whom DO and BOO were confirmed preoperatively [34]. In another study, 33% (50/152) of men who had elective prostatectomies continued to experience at least one OAB symptom [35]. These studies suggest that although BOO and voiding symptoms may be treated surgically, they may not be appropriate for men with DO and predominant OAB symptoms.

In summary, OAB symptoms are highly prevalent in men and adversely affect mental and physical well-being. Prostatic pathology and coexisting OAB symptoms are not always causally related, and many men with OAB symptoms do not have BOO. In fact, OAB symptoms may be more indicative of bladder dysfunction such as DO than prostatic conditions such as BOO and often persist after prostatectomy or TURP. Thus, practitioners who treat men with OAB symptoms should consider the possible involvement of bladder dysfunction.

4. α_1-Receptor antagonists and 5α-reductase inhibitors

Despite the evidence that LUTS are not disease- or condition-specific and hence, are not indicative of BPH or BOO, the most commonly prescribed treatments for LUTS, including OAB symptoms, target the prostate. α_1-Receptor antagonists such as doxazosin, terazosin, alfuzosin, and tamsulosin, and 5α-reductase inhibitors such as finasteride and dutasteride, possess favorable tolerability profiles and effectively treat voiding LUTS in many men with BOO [36], but these agents may not be the most effective treatments for the OAB component of male LUTS.

The low density of detrusor α_1-receptors in the unobstructed bladder precludes significant direct effects of α_1-receptor antagonists on detrusor contractility [37], and studies that investigated the effects of BOO on α_1-receptor expression and α_1-receptor-mediated detrusor contractility have yielded conflicting results [38,39]. Nonetheless, 12 weeks of treatment with the α_1-receptor antagonist doxazosin failed to effectively treat LUTS in 65% of men with BOO and DO [23]. Furthermore, the ability of histological changes mediated by 5α-reductase inhibitors to directly attenuate DO and related OAB symptoms has not been demonstrated. Evidence also suggests that men with prostate volumes >40 cc are most likely to experience significant symptom improvement with finasteride relative to placebo [40], and symptomatic improvements may require six months of treatment [41]. However, a study of dutasteride demonstrated that 5α-reductase inhibition reduced the severity of urinary symptoms in men with baseline prostate volumes >30 ml [42].

Even though many men with LUTS do not have BOO and many of those who have BOO still complain of OAB symptoms after obstruction is relieved pharmacologically or surgically, a recent study demonstrated that most pharmacotherapies prescribed for men with OAB symptoms target the prostate rather than the bladder. Jumadilova et al. [43] used a medical and pharmacy claims database of more than 30 geographically diverse managed care plans to identify men at least 18 who were newly diagnosed with OAB. Of those without a BPH diagnosis, 22% were prescribed BPH agents alone (α_1-receptor antagonists, 5α-reductase inhibitors), 11% received OAB agents alone (antimuscarinics), and 6% received both. Sixty-one percent of these men received neither therapy. Thus, 56% of men with OAB symptoms without a BPH diagnosis who received OAB or BPH agents were prescribed BPH agents alone [43].

5. Focus on the bladder: antimuscarinics

Correlations between DO and OAB symptoms [29] clearly indicate a multifactorial pathogenesis for bladder dysfunction in the development of storage LUTS. Changes in the properties of detrusor smooth muscle may lead to enhanced excitability and result in spontaneous detrusor contractions characteristic of DO [44]. Age-related changes that may contribute to the development of DO include increases in protrusion junctions, which may affect electrical activity between smooth muscle cells [45]. Changes in unmyelinated, capsaicin-sensitive C-afferents (which are believed to mediate sensations of bladder fullness) may also induce the urge to urinate at low bladder volumes [45]. A combination of these factors, which are often combined with central nervous system changes, may play a pivotal role.

Antimuscarinics block acetylcholine binding at muscarinic receptors throughout the bladder, and muscarinic receptor blockade inhibits detrusor smooth muscle contraction [46]. Although several antimuscarinics are used to treat OAB, tolterodine has been most extensively investigated for the treatment of male OAB symptoms. The efficacy

and safety of tolterodine were demonstrated in recent trials, and suggest that antimuscarinic drugs successfully treat OAB in men. For example, men with OAB symptoms and UUI in the absence of clinically significant BOO experienced significant reductions in UUI episodes (−71%) compared with placebo (−40%) after 12 weeks of treatment with tolterodine extended release (ER) [47]. Significant reductions in total micturitions and urgency-related micturitions were also observed in men with OAB symptoms who received tolterodine ER treatment for 12 weeks [48]. These reports suggest that antimuscarinic treatment safely ameliorates OAB symptoms in men, but these were secondary analyses of subpopulations and should be confirmed in prospective clinical trials.

Thirty-nine men with BPH and LUTS who had failed α_1-receptor antagonist therapy because of adverse events or lack of efficacy demonstrated significant reductions in micturition frequency, nocturia, and AUA symptom scores after six months of open-label treatment with tolterodine ER. A significant increase in Q_{max} and a decrease in PVR were observed in the same study [49]. These results also support a role for antimuscarinics in the treatment of male OAB; however, large, placebo-controlled studies in men with OAB symptoms and other LUTS are needed to demonstrate the efficacy and safety of antimuscarinics in this population of men.

5.1. *Antimuscarinic safety*

There is concern that the inhibitory effect of antimuscarinics on detrusor muscle contraction could theoretically aggravate the voiding difficulties of, or cause urinary retention in men with OAB symptoms and possible BOO. However, little evidence from clinical trials has supported the concern. In a meta-analysis of randomized controlled trials of antimuscarinics used to treat OAB, only oxybutynin IR significantly increased the risk of urinary retention compared with placebo [50]. Men with BOO and DO who received tolterodine for 12 weeks demonstrated no change in Q_{max} and a reduction in detrusor pressure at Q_{max}. Tolterodine-treated men demonstrated a statistically significant increase in PVR compared with placebo, but whether this increase was clinically relevant is unclear. In this study, tolterodine was not associated with an increase in acute urinary retention (AUR) that required catheterization [51]. There was also no incidence of AUR among 39 men with BPH and LUTS who received open-label tolterodine ER treatment for six months [49].

Historically, physicians have used increased PVR and decreased Q_{max} to identify patients at risk for urinary retention. As noted earlier, PVR may increase with BOO, but it represents detrusor decompensation rather than prostatic obstruction per se. Thus, urodynamic indicators of bladder dysfunction are more predictive of urinary retention. For instance, in urodynamic studies of men with LUTS and BOO, Te et al. [52] observed significantly greater pressure of maximum detrusor contraction and detrusor contraction length in those with a history of urinary retention than in those without. Studies also suggest that men with bladder decompensation (increased mass, decreased compliance, cholinergic denervation) secondary to BOO or neuropathy secondary to diabetic or peripheral nerve injury may be at the greatest risk for developing AUR [53]. Poor compliance, one element of the decompensatory response, is associated with DO and BOO [54]. In cases of advanced decompensation secondary to severe, long-term obstruction, normal bladder function is unlikely to be restored with α_1-receptor antagonists or antimuscarinic treatment.

5.2. *Combination therapy*

Despite the evidence that antimuscarinics may safely and effectively treat OAB symptoms in men, only 40% of men with OAB symptoms who receive drug treatment are prescribed antimuscarinics [43]. Antimuscarinics can be safely combined with α_1-receptor antagonists to treat men with OAB symptoms in the presence or absence of BOO [23,55]. Recent studies suggest that antimuscarinic/α_1-receptor antagonist combination treatments may more effectively reduce male LUTS than α_1-receptor antagonists alone. Fifty men with urodynamically confirmed BOO and DO received tamsulosin for one week before being randomized to tamsulosin/tolterodine combination therapy or tamsulosin alone. Significant reductions in maximum detrusor pressure during micturition and maximum involuntary contraction pressure were observed in men who received the combination treatment for three months. These patients also demonstrated significantly increased Q_{max} and volume at first involuntary contraction, as well as improvements in a quality of life measure. Changes in maximum detrusor pressure, maximum involuntary contraction pressure, and quality of life measures did not reach statistical significance in patients who received tamsulosin alone. There was no incidence of urinary retention in either treatment group [55].

Combinations of antimuscarinics and α_1-receptor antagonists have also proven effective for many men who have failed treatment with α_1-receptor antagonists alone. Of 44 men with urodynamically confirmed DO and BOO who failed three-month treatment with doxazosin, 32 (73%) experienced symptomatic improvements after three-month treatment with doxazosin and tolterodine. Thirty-eight percent (6/16) of men with BOO alone also experienced symptomatic improvements with the combination therapy after symptoms did not improve with doxazosin alone [23]. One patient in each treatment group developed AUR that required overnight catheterization (personal communication). Patients in the Athanasopoulos et al. [55] and Lee et al. [23] studies were enrolled based, in part, on the results of urodynamic evaluations. This aspect limits the applicability of the results to clinical practice, where patients are initially treated based on symptoms rather than on urodynamic endpoints. These studies suggest that antimuscarinics alone or in combination with α_1-receptor antagonists or, possibly, 5α-reductase inhibitors may provide the most efficacious initial therapy for men with OAB symptoms in the presence or absence of prostatic pathology. To date, no studies have evaluated the efficacy of combining antimuscarinics with 5α-reductase inhibitors. However, there is no evidence to suggest that 5α-reductase inhibitors cannot also be safely combined with antimuscarinics for the treatment of men with BPH and OAB symptoms. Despite the success of combination therapy in clinical trials, Jumadilova et al. [43] reported that only 8% of 4806 men with OAB symptoms and a BPH diagnosis were prescribed a combination of agents targeting the prostate and the bladder.

6. A new approach to the treatment of male overactive bladder

Madersbacher [56] recently wrote that ''Empirical treatment is considered to be justified when the symptoms are bothersome and have impact on the quality of life, when treatments have no or low morbidity and when early assessment of treatment success is planned.'' We recommend further evaluation of the potential for an empirical approach to the initial treatment of male OAB symptoms. Our approach would rely on careful assessment of OAB symptoms, a physical examination, and urinalysis. An α_1-receptor antagonist would be prescribed if BOO is suspected based on symptom assessment or uroflowmetry. In men with enlarged prostates, a 5α-reductase inhibitor may also improve symptoms. Adjuctive treatment with an antimuscarinic would be considered for patients with a normal urinalysis and no clinically significant PVR whose symptoms do not respond sufficiently to this therapy. This approach may reduce the need for expensive and invasive urodynamic procedures in patients whose OAB symptoms respond to treatment with α_1-receptor antagonists, 5α- reductase inhibitors (where appropriate), antimuscarinics, or combination therapy.

7. Summary

Clinicians should use the terms *OAB* and *LUTS* to describe symptoms and to use *DO*, *BPH*, and *BOO* only when appropriate diagnostic procedures are completed. We also emphasize that male OAB symptoms are storage LUTS that may occur with BPH or BOO without being caused by the prostatic condition. OAB symptoms may be the results of primary DO or DO secondary to BOO; thus, pharmacotherapies and surgical interventions that target the prostate may not alleviate OAB symptoms. When used alone or in combination with α_1-receptor antagonists, antimuscarinic agents relieve male OAB symptoms without increasing the risk for urinary retention in patients with comorbid BOO. Successful initial treatment with antimuscarinics alone or in combination with other agents may preclude the need for urodynamic testing in men with OAB symptoms. Urodynamics should be reserved for cases resistant to therapy or performed before a more invasive therapeutic intervention, particularly in men with predominant storage symptoms. At present, we must conclude that the literature is based on pilot studies that use urodynamic criteria for patient selection that do not necessarily represent real life practice. Some of these studies are not placebo controlled or are not adequately powered. Combination therapy with an anticholinergic and an α_1-receptor antagonist in men with OAB and with suspected BOO is an interesting potential direction in pharmacotherapy that requires testing in well-designed clinical trials before it can be recommended for routine clinical use.

Disclosures: Dr. Chapple is a scientific consultant to Pfizer, Schwarz Pharma, Astellas, Novartis and UCB.

Dr. Roehrborn has consulted with Pfizer Inc regarding the development of anticholinergic drugs in the treatment of men with lower urinary tract symptoms, benign prostatic hyperplasia, and overactive bladder.

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Editorial Comment

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Lower urinary tract symptoms (LUTS) cannot be used to make a definitive diagnosis [1]. In men with LUTS, the definitions of benign prostatic hyperplasia (BPH) and bladder outlet obstruction (BOO) require histological and urodynamic confirmations, respectively. Although voiding and postmicturition symptoms may be related to BOO caused by benign prostatic enlargement/BPH, a relevant percentage of patients also experience storage symptoms [2].

In this review, Chapple and Roehrborn highlight that overactive bladder (OAB) symptoms are a subset of storage LUTS that may be caused by a poorly functioning detrusor rather than by prostatic pathology. Specifically, OAB symptoms may be the results of primary or secondary BOO or detrusor overactivity (DO), but can also occur because of other forms of urinary dysfunction. An attractive possibility is that urgency might be

related to the activation of non-detrusor muscarinic receptors, localised on urothelial or interstitial cells, in the absence of DO [3]. That explains why medical or surgical therapies that target the prostate may not improve storage symptoms. The logical consequence of the shifted paradigm that focuses on the bladder is the potential use of antimuscarinic drugs, alone or in combination with α_1-receptor antagonists, in patients with bothersome OAB symptoms. This is clearly an interesting expert opinion that is supported by two recent studies that investigated the role of tolterodine in combination with tamsulosin [4] or doxazosin [5] in men with BOO. Those pilot studies, which analysed fewer than 100 patients, demonstrated favourable preliminary results in terms of both efficacy and safety. Specifically, tolterodine was not associated with an increased risk of urinary retention. This issue could be explained by considering that antimuscarinics act mainly during the storage phase, while their effects decrease during the voiding phase when a massive release of acetylcholine is present [3].

The results obtained in the pilot studies that combined tolterodine and α_1-receptor antagonists can be generalized only to patients with urodynamically confirmed DO and BOO. Those patients are different from those described in the scenario of the proposed new ''empirical'' approach to the treatment of OAB symptoms in patients with LUTS that are suggestive of BPH. Antimuscarinic drugs are proposed for the patients with normal urinalysis, absent postvoid residual and storage symptoms, who do not respond sufficiently to α_1-receptor antagonists, regardless of an invasive urodynamic diagnosis.

The new pharmacological approach to the treatment of OAB in patients with suspected BOO might be wise advice, based on a valid rationale. Its application in real-life practice, however, has to be based on larger and well-designed randomised controlled trials, which are still lacking.

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