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Obstructive voiding symptoms in female patients with overactive bladder syndrome

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ABSTRACT

Objectives: To characterize obstructive voiding symptoms (OVS) in patients with overactive bladder (OAB) and normal postvoid residual volume (PVR) and assess their impact on patients' quality of life (QoL) and sexual function.

Study design: Patients with OAB and normal PVR who visited our urogynecologic clinic between November 2016 and June 2017 were asked to fill a questionnaire comprising of 14 statements regarding Obstructive VOiding Symptoms (the OVOS questionnaire). Patients additionaly completed the UDI-6 and IIQ-7 questionnaires. Statistical analysis was performed to determine the prevalence of each OVS and its correlation with the UDI-6 and IIQ-7 scores.

Results: Thirty-eight women enrolled in this study. The OVOS questionnaire was found to have good reliability (Cronbach's alpha = 0.75) and construct validity. Thirty-six (95%) women reported having at least one, while 34 (90%) had at least two, and 31 (82%) had at least three OVS. The statement: `I feel that I am unable to empty my bladder completely` significantly correlated with the sense of frustration (r = 0.44, p = 0.006), as well as with the overall negative impact of urinary incontinence on QoL (r = 0.36, p = 0.03). The statement: `I feel a sensation of fullness immediately after I empty my bladder` significantly correlated with the total impact of urinary incontinence on sexual function (r = 0.42, p = 0.031).

Conclusions: Most patients with OAB and normal PVR complain of OVS which may increase the burden on their QoL and sexual function. Some OVS correlate with various segments of the UDI-6 and IIQ-7 questionnaires, suggesting that storage and OVS may share common pathophysiological mechanisms.

Introduction

The International Urogynecologic Association (IUGA) and the International Continence Society (ICS) have classified lower urinary tract symptoms (LUTS) into storage, voiding, post-micturition and pelvic organ prolapse symptoms [1]. Overactive bladder syndrome (OAB), which is considered to be a bladder storage syndrome, is defined as 'urinary urgency, usually accompanied by increased urinary frequency and nocturia, with or without urinary incontinence, in the absence of urinary tract infection or other obvious pathology' [1]. To date, obstructive voiding symptoms (OVS) are not acknowledged as part of the clinical picture of OAB and are not included in its diagnostic criteria. On the contrary, the Fourth International Consultation on Incontinence (ICI) has advocated a comprehensive symptom evaluation of all women presenting with urinary incontinence in order to rule out voiding dysfunction [2]. Moreover, clinical trials evaluating pharmacologic treatment for OAB often use increased post void residual volume (PVR) as an exclusion criterion [3]. Despite these strict guidelines, recent studies have shown some overlap between storage and voiding symptoms in a substantial proportion of women with OAB [4–6]. Other studies have even reported urodynamic findings of voiding dysfunction (VD) and urinary retention in some of these patients [7–9]. We have been under the impression that women diagnosed with OAB often describe OVS such as difficulty in bladder emptying, slow urine stream, and hesitancy even in the absence of objective urinary retention. Since OVS have not yet been well characterized in patients with OAB and normal bladder emptying, the aim of this study was to characterize these symptoms and to assess their impact on patients` quality of life (QoL) and sexual function.

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Materials and methods

This was a prospective study conducted at the our urogynecologic outpatient clinic between November 2016 and June 2017. Women who visited our clinic and complained of LUTS underwent a comprehensive evaluation, including history taking, a pelvic examination, sonographic PVR assessment and urinalysis. Diagnosis of OAB was made on the basis of the accepted IUGA/ICS criteria (1). Women who were diagnosed with OAB with a PVR <100cc and normal urinalysis were offered to fill the Obstructive VOiding Symptoms (OVOS) questionnaire (Table 1). This questionnaire was designed specifically for this study and consisted of 14 statements regarding OVS. Patients were asked to rate their agreement to each statement on a 5-point Likert scale, where 1 indicated `I totally disagree` and 5 indicated: `I totally agree`. Irrelevant statements were asked to be marked as `non-applicable`. In addition, all women were asked to fill the validated Urogenital Distress Inventory -6 (UDI-6) and Incontinence Impact Questionnaire -7 (IIQ-7) (10). Study participants were also asked to rank the overall negative impact of urinary incontinence on their QoL by answering the question: 'What is the overall negative impact of urinary incontinence on your QoL?` and on their sexual function by answering the question: 'How much has your sexual life been affected by urinary incontinence?'. Demographic and clinical data including age, menopausal status, parity, mode of deliveries, chronic illnesses, caffeine and fluid intake as well as smoking habits were also recorded for all patients. Patients who were unable to read or write or those with advanced pelvic organ prolapse (stage III and above), urinary retention (PVR > 100 ml), a history of surgery for urinary incontinence or pelvic irradiation, and those with abnormal urinalysis were excluded from the study.

Statistical analysis was performed using SPSS package for window version 18. Sample size estimation was performed before the initiation of the study. Given a confidence level of 95%, a power of 0.8, and assuming a correlation of 0.35 between the OVOS and the UDI and IIQ questionnaires, a sample size of 38 women was needed for this study. We calculated the scoring of each OVS in the OVOS questionnaire and assessed its correlation to the total UDI-6 and IIQ-7 scores, and to the overall negative impact on patients' QoL and sexual function using Spearman`s correlation test. A p value <0.05 was considered statisticaly significant for all comparisons. We utilized Cronbach's alpha testing to assess reliability of the OVOS questionnaire. In addition, we determined construct validity of this questionnaire by calculating correlations between the OVOS and the UDI-6 and IIQ-7 questionnaires. The study was approved by the Carmel Lady Davis Medical Center Institutional Review Board Committee for Human Subjects (approval no. 0123-16-CMC).

Results

Forty six women with OAB were offered to enroll in the study, 40 agreed and signed an informed consent, and 38 fulfilled the inclusion criteria and were available for analysis. Mean age was 66 ± 7.8 years, 79% were postmenopausal, with a mean parity of 3 (0–7). Mean caffeine intake was 2 (0–4) cups/day, and total fluid intake was 1500 ± 130 mL/day. Nine percent were smokers, and 52% reported having stress urinary incontinence. Twenty one (54.6%) of the study subjects were sexually active. Mean PVR in these patients was 32 ± 9.2 mL. The OVOS questionnaire was found to have good reliability with a Cronbach's alpha of 0.75. Construct validity was also high with good correlation between the OVOS and the UDI-6 and IIQ-7 questionnaires. Thirty-six (95%) women reported having at least one OVS, while 34 (90%) had at least two, and 31 (82%) had at least three OVS (Fig. 1). The most significant statements with a median score of 3 or higher were: `I often need to return to the bathroom within 15 min from a previous urination'; `I feel that I am unable to empty my bladder completely`; and `I feel a sensation of fullness immediately after I empty my bladder (Fig. 2). The statement: `I feel that I am unable to empty my bladder completely` significantly correlated with the sense of frustration (r = 0.44, p = 0.006), as well as with the overall negative impact of urinary incontinence on QoL (r = 0.36, p = 0.03) (Fig. 3). The statement: `I feel a sensation of fullness immediately after I empty my bladder` significantly correlated with the overall negative impact of urinary incontinence on sexual function (r = 0.42, p = 0.031) (Fig. 3).

Comment

The overlap between different categories of LUTS's is widely accepted today. The EPIC population-based, cross-sectional survey reported the prevalence of LUTS among women to be around 62%, of whom 59% reported storage and 19.5% reported OVS [4]. In the BACH survey [5], nearly one fifth of all subjects had moderate to severe LUTS with high prevalence of both storage and voiding symptoms. The EpiLUTS survey found that a substantial proportion of women who reported OVS also had post-micturition and storage symptoms [6]. These large cross-sectional surveys endorse the overlap between storage and voiding LUTS and emphasize the importance of employing a broad perspective in the management of these symptoms. Several other studies have reported on storage symptoms in women with objective urinary retention and voiding dysfunction (VD) [11–13] while others reported on objective urinary retention and VD in women with storage symptoms [7–9]. Nonetheless, to date only scarce data exist regarding the prevalence and significance of OVS in a selected population of women with OAB and normal bladder emptying. The current study addresses this question using the novel

Table 1
Obstructive VOiding Symptoms (OVOS) Questionnaire.

No.	Statement
1.	I often feel lower abdominal pain
2.	I often feel that I am unable to empty my bladder completely
3.	I often feel hesitancy at the beginning of urination
4.	I often use my abdominal muscles in order to urinate
5.	I often lean forward or change position in order to urinate
6.	My urine stream is often interrupted
7.	I often feel that my urine stream deviates to the side
8.	I often feel that I have a slow urine stream
9.	I often feel a sensation of fullness immediately after I empty my bladder
10.	I often need to return to the bathroom within 15 min from a previous urination
11.	I often have an involuntary urine leakage after the end of urination
12.	I often have a burning sensation while urinating
13.	I often press my lower abdomen in order to empty my bladder
14.	I often need to press at any point of my labia or vagina in order to empty my bladder

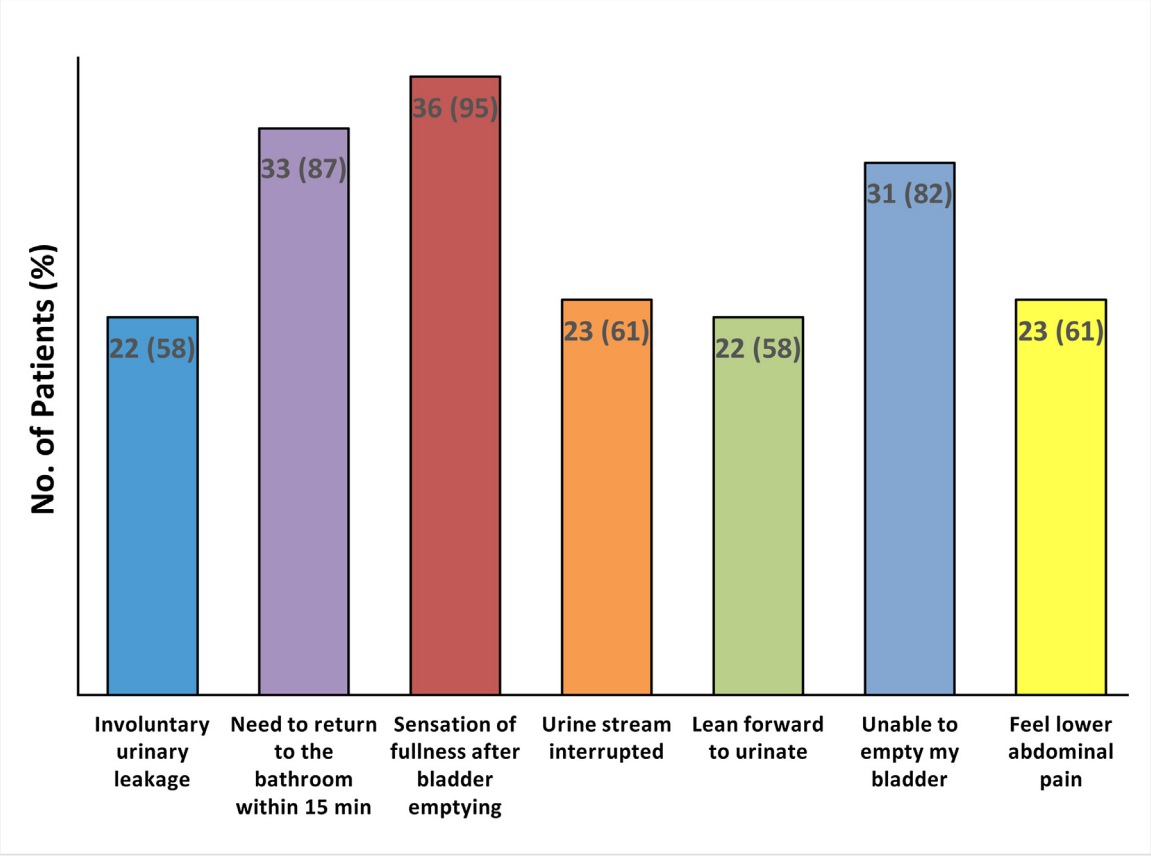

Fig. 1. No. (%) of patients who ranked OVOS statements highly (score ≥3).

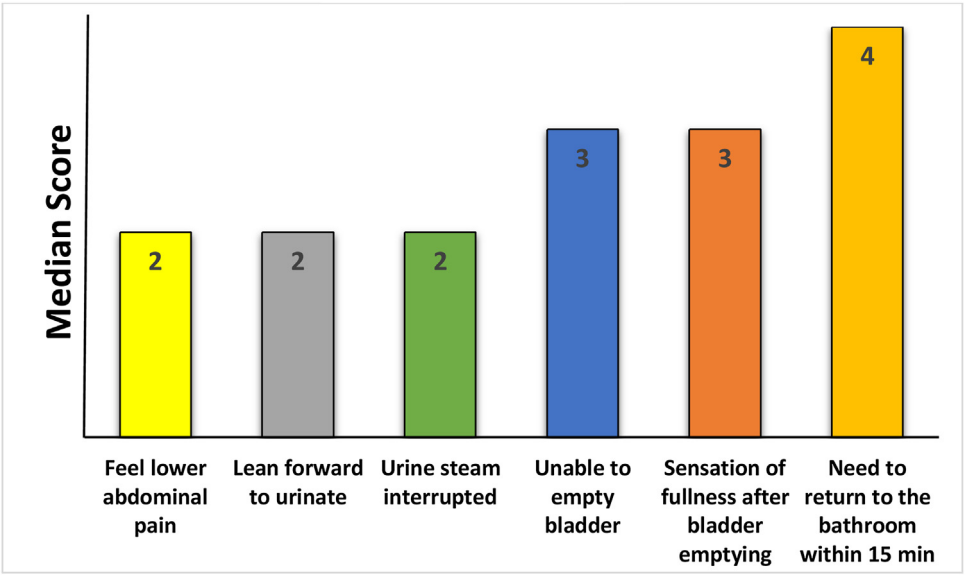

Fig. 2. Highest ranked OVOS statements scores.

validated OVOS as well as the well-established UDI-6 and IIQ-7 questionnaires. Its results indicate that most women with OAB also suffer from at least one OVS despite having normal PVR. A large proportion of these women have even two or more OVS concomitantly. Some of these symptoms correlate with the classical OAB storage symptoms and increase the burden on patients' QoL and sexual function. The correlation between the OVOS questionnaire and various segments of the UDI-6 and IIQ-7 questionnaires in this population suggests that storage and OVS may share common pathophysiological mechanisms. These findings stand in contrast to the widely accepted concept which classifies OAB purely as a storage phase abnormality [1].

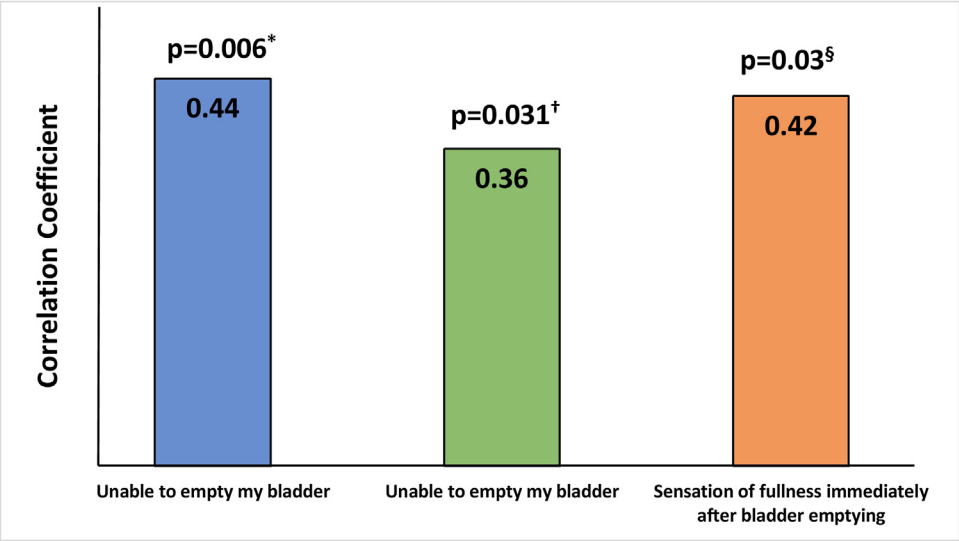

Fig. 3. Correlation coefficients between the highest ranked OVOS statements and:
*The sense of frustration.
†The overall negative impact of urinary incontinence on OoL.
§The overall negative impact of urinary incontinence on sexual function.

It should be emphasized that PVR > 100 mL was one to the exclusion criteria in our study, and therefore the high prevalence of OVS does not reflect objective VD but rather a subjective perception of abnormal bladder emptying. A possible explanation for the high prevalence of OVS found among OAB patients in this study despite normal PVR may lie in the normal physiology of micturition. Bladder emptying is largely dependent on its pre-void volume, in a similar manner to the Frank-Starling mechanism known from heart muscle physiology [14]. The 'Liverpool Nomograms' reported by Haylen et al. in 1989 [15] have shown that the maximum and average urine flow rates in both males and females demonstrate equally strong relationship to bladder volumes. While lower bladder volumes are associated with slow urine stream, higher volumes are associated with substantially increased flow rates. For instance, the median maximum flow rate for a bladder volume of 50 mL is 15 mL/sec, while that of a bladder volume of 600 mL is 42 mL/sec. More recent data, however [16], has suggested that in exceedingly high bladder volumes (>700 mL), flow rates may reach a plateau, and eventually even decrease with additional rise in bladder volume. The mechanism behind this physiologic phenomenon is unclear, however, it seems that in analogy to the heart muscle with its Frank-Starling mechanism, the bladder has a range of filling volumes within which it performs optimally. Outside this range (i.e. in extremely low or high filling volumes) it performs less efficiently, as manifest by slower urine flow. It is well established that patients with OAB have low bladder capacity [17]. The current study showed that they also tend to re-empty their bladder quite frequently despite not having significant PVR's. Consequently, voided volumes in these patients are expected to be substantially lower than in normal individuals. Although flow rates were not measured in the current study, according to the Liverpool Nomograms, these were probably correspondingly low in these patients, which may account for some of the reported OVS such as slow or interrupted urine stream and hesitancy. Moreover, OAB is frequently associated with urothelial and detrusor hypersensitization [18], which may explain symptoms of incomplete bladder emptying and the need for frequent re-emptying as reported by some patients in this study. This combination of slow urine stream, hesitancy and the feeling of incomplete bladder emptying may lead OAB patients to the conclusion that they have a voiding problem. Although not within the scope of this study, we are currently investigating whether behavioral and medical therapies along with reassurance and education can alleviate OVS in OAB patients. Pelvic floor physical therapy focusing on bladder drills to prolong voiding intervals and patient education to refrain from repeated bladder emptying may increase voided volumes, and consequently enhance urine flow and improve OVS. The OVOS questionnaire, which was developed for and utilized in this study was validated and found to have good reliability and construct validity. This questionnaire may be used in clinical practice by physicians, nurses, and pelvic floor physical therapists to assess and follow on OVS and thus target behavioral therapy more accurately. It may also serve as an investigational tool for future studies in this field.

Limitations of the current study include its relatively small sample size. Nonetheless, the number of subjects enrolled conforms to the sample size estimation performed before the initiation of the study. Furthermore, the sample size was sufficient to achieve tangible and statistically significant results and validate the OVOS questionnaire. The lack of free-flow or pressure/flow studies is another limitation of this study, despite the PVR assessment performed in all patients. Future research, preferably utilizing free flow and pressure/flow studies should try to refine our understanding of the pathophysiological mechanisms behind OVS in OAB patients, and find more effective modalities to alleviate patients' symptoms and improve their OoL.

In conclusion, the vast majority of women with OAB report substantial OVS without having objective evidence of urinary retention. These symptoms seem to correlate with the classical OAB storage symptoms and add to patients' burden with regard to QoL and sexual function. This correlation suggests common pathophysiological mechanisms for both storage and voiding symptoms in OAB patients and seems to chalange the current classification of OAB purely as a bladder storage syndrome. Treatment strategies aiming to target OVS in OAB patients should be further investigated. The OVOS questionnaire, specifically developed for this study, is a relaible tool to assess and follow on OVS in OAB patients.

Financial disclaimers

None.

Author contributions

Project development: Abramov, Haya, Zilberlicht, Feferkorn, and Lavie; data collection and managment: Zilberlicht, Haya, Goldschmidt, and Abramov; data analysis: Zilberlicht, Abramov, Feferkorn, Lavie, and Goldschmidt; manuscript writing/editing: Zilberlicht, Feferkorn, Haya, Lavie, Abramov and Goldschmidt.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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None.

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