Original article

Do female patients with predominant voiding symptoms really have objective voiding-phase dysfunction?

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1. Introduction

The prevalence of subjective voiding symptoms in women varied from 14.9% to 61.7%.1-3 Of women aged over 40 years, 6% have objective voiding dysfunction.¹ The prevalence of objective voiding dysfunction in women with subjective voiding symptoms is much less investigated.¹ Actually, in females with voiding dysfunction the predictive value of voiding symptoms is rather low.⁴

Female voiding dysfunction might be related to detrusor underactivity (DU) or/and bladder outlet obstruction (BOO). Voiding and storage symptoms could coexist, which makes the diagnosis challenging. Kuo concluded that clinical symptoms alone are not reliable in the differential diagnosis of lower urinary tract symptoms (LUTS) in women.⁵ Therefore, further evaluation by imaging and urodynamics might be mandatory.

Nevertheless, urodynamic studies are invasive and expensive procedures with limited availability. Patient weighting of severity of LUTS might be a valuable alternative. In the present study, we attempt to analyze whether female patients with predominant voiding symptom really have objective voiding phase dysfunction.

2. Materials and methods

We recruited female patients with LUTS who underwent video-urodynamic study between January 2009 and December 2012. All
patients were interviewed for their detailed personal and medical history. Patients with overt neurological disorders (e.g., spinal cord pathology) were excluded. All patients completed a 3-day frequency-volume chart documenting voided volume, incontinence and urgency episodes, and daytime and nighttime urinary frequency.

Symptom severity was evaluated using International Prostate Symptom Score (IPSS), Overactive Bladder Symptom Score (OABSS) and Urogenital Distress Inventory (UDI-6) questionnaires. Patients were also requested to identify the one most bothersome symptom from IPSS. The IPSS questionnaires composed of urine storage-related and micturition-related symptoms. A subtotal score for Question 1 (incomplete emptying), Question 3 (intermittency), Question 5 (weak stream), and Question 6 (straining) was designated as the voiding subscore. A subtotal score for Question 2 (frequency), Question 4 (urgency), and Question 7 (nocturia) was designated as the storage subscore. The patients with IPSS-voiding subscores greater than IPSS-storage subscores whose most bothersome symptom was one of voiding symptoms of IPSS were defined as subjective voiding dysfunction group (SVD group). The other patients were defined as non-SVD group.

A video-urodynamic study was performed with the patient in the sitting position. Abdominal pressure was measured using a 24F rectal balloon catheter. Intravesical pressure was determined using an 8F transurethral catheter. Filling cystometrography was performed at a filling rate of 30 mL/min. Our definition of DU in urodynamic study was maximum flow rate ($Q_{\text{max}}$) < 12 mL/s and detrusor pressure ($P_{\text{det}}$) at maximum flow ($P_{\text{det}}$ at $Q_{\text{max}}$) < 10 cmH2O. Primary bladder neck obstruction was defined as detrusor contraction of any magnitude with radiographic evidence of obstruction at the bladder neck with relaxed striated sphincter. The diagnosis of dysfunctional voiding was made on the basis of radiographic evidence of obstruction at mid-urethra in the presence of a sustained detrusor contraction and dys-synergic sphincter contraction in neurologically normal individuals.

The demographics, IPSS scores, OABSS scores, frequency-volume charts and urodynamic variables were compared between SVD and non-SVD groups. Student $t$ test and ANOVA were used for univariate analysis, while Mann–Whitney U test was applied for the analysis of the questionnaires. A $p$ value < 0.05 was defined as statistically significant.

### 3. Results

Of the 842 enrolled patients, 142 (16.9%) were classified into the SVD group. All demographic variables, including age and comorbidities (hypertension, type 2 diabetes mellitus, coronary artery disease, and cerebrovascular accident), were similar between SVD and non-SVD groups (Table 1).

Total IPSS and IPSS-voiding subscores of the SVD group were significantly lower in the SVD group than those in the non-SVD group (Table 1). Total IPSS and IPSS-voiding subscores of the SVD group were significantly lower in the SVD group than those in the non-SVD group (Table 1).

Parameters of frequency-volume charts showed that 24-hour frequency, nocturnal frequency, and urgency episodes were significantly lower in the SVD group than those in the non-SVD group (Table 3).
Bladder volume at the first desire to void and cystometric capacity were significantly larger in the SVD group. Catheter-free mean and maximum uroflow rate was significantly higher in the non-SVD group (Table 4). The prevalence of differential etiologies of voiding phase dysfunction is shown in Table 5.

A total of 356 female patients with LUTS were diagnosed as urodynamic voiding phase dysfunction, including BOO and impaired detrusor contractility (Table 6). The prevalence of voiding phase dysfunction was 92/142 (64.7%) in the SVD group, which was significantly higher than that in the non-SVD group (264/700, 37.8%). As being the single diagnostic tool in predicting voiding phase dysfunction in female patients with LUTS, the sensitivity and specificity of SVD was 92/356 (25.8%) and 436/486 (89.7%), respectively. Furthermore, the positive and negative prediction values were 92/142 (64.8%) and 436/700 (62.3%), respectively.

The SVD group showed more prevalent BOO (50.0% vs. 27.0%), including dysfunctional voiding, bladder neck obstruction, and poststress urinary incontinence surgery. Nevertheless, there were no significant differences in the prevalence of impaired detrusor contractility, including DU and acconctile detrusor between the SVD group and the non-SVD group. It is important to note that 35.3% patients in the SVD group did not have objective voiding phase dysfunction. These patients were clinically diagnosed as nonulcer bladder pain syndrome/interstitial cystitis (BPS/IC) or stress urinary incontinence (Table 6). Moreover, detrusor overactivity was more prevalent in the non-SVD group.

4. Discussion

Our study revealed that the sensitivity and specificity of SVD for detecting objective voiding phase dysfunction in female patients with LUTS was 25.8% and 89.7%, respectively. Despite the poor sensitivity, the specificity was fairly good. If female patients with LUTS are not compatible with the criteria of SVD, we could almost exclude the possibility of voiding dysfunction and prescribe antimuscarinic agents directly for LUTS. Hsiao et al utilized IPSS-voiding to IPSS-storage subscore ratio (IPSS-V/S) to predict the voiding dysfunction in female patients with LUTS. They reported that IPSS-V/S of ≥1.33 had the best predictive value with a high sensitivity (92.9%) and negative predictive value (97.4%). Moreover, the specificity and positive predictive values were 62.6% and 36.9%, respectively. Therefore, we might combine SVD and IPSS-V/S to increase the diagnostic accuracy of objective voiding dysfunction in female patients with LUTS.

In the present study, BOO was more prevalent than underactive bladder in female patients with predominant voiding symptoms. Choi et al reported that 87.2% of a total of 102 female patients with voiding dysfunction were diagnosed as BOO, while 12.8% patients showed DU. Conversely, two large-scale retrospective studies have demonstrated the prevalence of BOO was quite low (0.15% and 2.7% separately) in female patients with voiding symptoms, around one third of them were found to have urodynamnic voiding-phase dysfunction. On the other hand, in female patients whose predominant complaints are not voiding symptoms, only 32% had an abnormal uroflowmetry. There was poor correlation between subjective voiding symptoms and objective voiding dysfunction in female patients with stress urinary incontinence. BPS/IC is a syndrome characterized by storage symptoms (urgency and frequency) and pelvic pain. Obstructive symptoms such as slow stream, dribbling, and straining are often referred as BPS/IC patients. Contrary to the present study, Cameron et al reported that 48% of BPS/IC patients met criteria for BOO which was defined as Qmax < 12 mL/s and Pdet at Qmax > 25 cm H2O. Of these women, 55.2% had the ulcer BPS/IC. Diverse definitions of BOO and BPS/IC types might responsible for the inconsistency.

UDI-6 assesses symptom distress and the impact on daily life of lower urinary tract symptoms. UDI-6 scores of the non-SVD group were significantly higher than those of the SVD group. In addition, IPSS-storage subscores and OABSS of the non-SVD group were significantly higher than those of the SVD group. The results suggested that storage symptoms have a greater overall impact on quality of life than voiding symptoms. Agarwal et al found that both men and women with urgency urinary incontinence report moderate or major bother more frequently than individuals with other LUTS. At the population level, the most prevalent bothersome symptoms are urgency, stress urinary incontinence, and nocturia.

5. Conclusions

Even though female patients complain of predominant voiding symptoms, only two thirds of them were identified having urodynamnic voiding-phase dysfunction. On the other hand, in female patients whose predominant complaints are not voiding symptoms, around one third of them were found to have urodynamic voiding-phase dysfunction. This study clearly indicates that in females subjective low urinary tract symptoms are not necessarily reliable.

Conflicts of interest

The authors declare that they have no financial or non-financial conflicts of interest related to the subject matter or materials discussed in the manuscript.

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