Is There a Role for Urodynamic Study in Women with Urinary Incontinence?

Elnaz Ayati,[1] Zinat Ghanbari,[2]** Mohsen Ayati,[3]* Erfan Amini[3], Maryam Deldar Pesikhani[2]

Purpose: To compare clinical and urodynamic study (UDS) findings in Iranian women with mixed or stress UI (Urinary Incontinence).

Materials and methods: A total of 132 patients with either stress or mixed type of UI were enrolled. After accurate examination, data regarding age, parity, mode of delivery and menopausal state were recorded. Furthermore the presence and severity of UI was evaluated with empty bladder supine stress test (ESST) and cough test in supine and standing positions in all patients. Eligible cases underwent UDS evaluation by an expert urologist using a standardized protocol.

Results: Stress and mixed UI were found in 33 (25%) and 99 (75%) patients respectively. By considering clinical evaluation as gold standard, sensitivity, specificity, positive and negative predictive value of urodynamic study were 83.4%, 30.4%, 43.4% and 80% for detecting stress UI and 96.1%, 35.6%, 34.7%, 96.2% for detecting mixed UI respectively. No correlation was noted between ESST or cough test results and Valsalva leak point pressure (VLPP) values in patients with stress UI, however ESST was correlated with VLPP values in patients with mixed UI.

Conclusion: Despite a relatively high sensitivity, the specificity was low and urodynamic evaluation seems to be of limited value in the assessment of UI in female patients.

Key words: Female; Urinary incontinence; Urodynamics

INTRODUCTION

Urinary Incontinence (UI) is defined as the involuntary loss of urine and is associated with discomfort, low self-esteem, and impaired quality of life[1]. One third of women of all ages report UI and the prevalence of UI varies in different countries from 17 to 45%[2,3]. Differences in definitions, study characteristics and target populations are the causes of this wide range[4]. UI is classified into three subtypes: stress, urgency, and mixed UI. Stress UI (loss of urine on exertion such as coughing, sneezing, lifting or laughing) is common in premenopausal women[5], while urgency UI (loss of urine with a strong desire to urinate) and mixed UI (co-existing stress and urgency UI symptoms) become prevalent in older women[5]. It is important to determine the type and severity of UI to consider the best treatment. Both clinical signs and urodynamic findings are used for UI diagnosis. Some investigators believe that urodynamic evaluation is not needed at first evaluation as it is costly and associated with discomfort[6,7] while others believe that it provides necessary information which helps accurate diagnosis[8]. As there are controversies regarding application of urodynamic study (UDS) in patients with UI and its correlation with subjective or objective measures of voiding function, we designed this study to compare clinical and UDS findings in Iranian women with mixed or stress UI.

MATERIALS AND METHODS

We conducted this cross-sectional study at our institution between August 2014 and August 2015. All women with at least 3 month duration of stress or mixed UI who were referred to our clinic were considered for enrollment. Questionnaire for Urinary Incontinence Diagnosis (QUID), was applied to distinguish between stress and urgency UI[9]. In patients with mixed UI, those who had QUID urgency UI score greater than stress UI score, were excluded from enrollment. Additional exclusion criteria were patient age 18 years or younger, positive urine culture, apical, posterior or anterior pelvic organ prolapse 1 cm or greater (> stage 2), prior history of UI surgery, pelvic surgery or radiation therapy and neurogenic bladder. All participants were asked to fill informed consent forms and institutional review board approved the study. After accurate examination, data regarding age, par-

[1] Department of obstetrics and gynecology, Tehran University of medical sciences, Tehran Iran.
[2] Department of Pelvic Floor, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran.
[3] Uro-Oncology Research Center, Tehran University of Medical Sciences, Tehran, Iran.
**Correspondence: Department of Pelvic Floor, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran.
Tel:+982161192365. Mobile:+989121305814. E-mail: drz_ghanbari@yahoo.com.
*Correspondence: Uro-Oncology Research Center, Tehran University of Medical Sciences, Tehran, Iran.
Tel:+982161192794. Mobile:+989121191522.
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Table 1. Correlation between VLPP in the urodynamic study and ESST results in patients with stress or mixed urinary incontinence

	VLPP	Positive ESST	Negative ESST	*P*-value
Stress UI	< 60	-	-	
	60 - 90	0	2	.5
	> 90	3	14	
Mixed UI	< 60	1	0	
	60 - 90	0	4	.02
	> 90	6	32	

Abbreviations: VLPP, Valsalva leak point pressure; ESST, Empty bladder leak point pressure; UI, Urinary incontinence

ity, mode of delivery and menopausal state were recorded. Furthermore the presence and severity of UI was evaluated with both cough and empty bladder supine stress test (ESST) in all patients. Included cases underwent UDS evaluation by an expert urologist using a standardized protocol. Patients were examined in supine position. Prior to the examination, patients were asked to void and post-void residual urine was measured. Urodynamic evaluation was performed with a 6F dual-lumen vesical catheter and a 9F rectal balloon catheter. Normal saline was infused at a rate of 30mL/min. Valsalva leak point pressure (VLPP) and cough leak point pressure were measured in cmH2O and recorded. All measurements were performed in both supine and standing positions. This study aimed to compare urodynamic variables with clinical findings to assess the correlation between UDS findings and objective/subjective measures of voiding function. All data were analyzed using SPSS software version 20 (SPSS Inc., Chicago, IL, USA). Student's t test and Chi square test were used to compare continuous and categorical variables respectively. *P* value of less than .05 was considered statistically significant.

RESULTS

A total of 132 patients with mean age of 51.8 ± 10.7 years ranging from 31 to 81 met inclusion criteria and were considered for analysis. Stress and mixed UI were found in 33 (25%) and 99 (75%) patients respectively. Women with stress and mixed UI were comparable in terms of age, body mass index and parity. Mean parity was 3.6 ± 1.6 and 4.3 ± 2.3 in women with stress and mixed UI respectively (p = .136). Among patients who presented with SUI, data on delivery mode was available in 30 patients. Twenty one patients had history of vaginal delivery, one patient had history of cesarean section and 8 patients had history of both vaginal delivery and cesarean section. Frequency of vaginal delivery was similar in both groups and we noted that the mode of delivery was not associated with incontinence type. Moreover rate of menopause was 48.4% and 47.4% in the two study groups. Among 33 patients with pure SUI, the diagnosis was confirmed in 19 patients (57.6%) during UDS. Moreover UDS confirmed UI in 41 of 99 (41.4%) patients who presented with mixed UI and predominant SUI. By considering clinical evaluation as gold standard, sensitivity, specificity, positive and negative predictive values of urodynamic study were 83.4%, 30.4%, 43.4% and 80% for detecting stress UI and 96.1%, 35.6%, 34.7%, 96.2% for detecting mixed UI respectively. In a separate analysis we sub-classified study participants into three groups based on VLPP values (VLPP of 60 cmH_2O or less, between 60 and 90 and > 90 cmH_2O). **Tables 1 and 2** show the frequency of patients with positive ESST or cough test in each group. No correlation was noted between ESST or cough test results and VLPP values in patients with stress UI, however ESST was correlated with VLPP values in patients with mixed UI. To assess the effect of age on urodynamic parameters, we subclassified the study population into three groups. Group 1 consisted of women younger than 45 years. In group 2 patients were between 45 and 60 and group 3 comprised women older than 60. Mean VLPP value was 133.8 ± 27.0, 144.2 ± 102.5 and 125.1±29.8 in groups 1, 2 and 3, respectively. Applying Kruskal Wallis test, no statistically significant difference was noted in VLPP values between different age groups (p=0.606). Cystometric capacity was normal in study participants and did not differ between patients with stress and mixed UI. **Table 3** compares bladder volume at first sensation, normal desire and strong desire between the 2 groups. As shown in **Table 3** normal desire occurred at higher bladder volumes in patients with stress UI compared to those with mixed UI. Furthermore max-

Table 2. Correlation between VLPP in the urodynamic study and cough test results in patients with stress or mixed urinary incontinence

	VLPP	Positive cough test	Negative cough test	*P*-value
Stress UI	< 60	0	0	.6
	60 - 90	1	1	
	> 90	6	11	
Mixed UI	< 60	0	1	.7
	60 - 90	1	3	
	> 90	12	24	

Abbreviations: VLPP, Valsalva leak point pressure; UI, Urinary incontinence

Table 3: Comparison of bladder volume at first sensation, normal desire and strong desire between the study groups.

	Stress UI	Mixed UI	*P*-value
Bladder volume at first sensation	138.5 ± 51.9	135.6 ± 64.4	.7
Bladder volume at normal desire	278.5 ± 78	257.6 ± 82.7	.04
Bladder volume at strong desire	450.3 ± 106.3	439.4 ± 120.2	.1

imal urine flow was comparable between the study groups and not correlated with the results of ESST or cough test. Urethral hypermobility was noted in 24 and 63 women with stress and mixed UI respectively. No correlation was also noted between the occurrence of urinary leakage during urodynamic evaluation and presence of urethral hypermobility in physical examination.

DISCUSSION

In this prospective study a large homogeneous group of female patients with stress or mixed UI were included and we noted that mixed UI is more prevalent compared to stress UI. Our results are compatible with the results of Digesu et al. In their study, 59% of women who were referred to a referral center in Italy had mixed UI[10]. Mixed UI, comprises 29 to 61% of all types of incontinence in the literature[11-13]. Similarly in a study by Pandey et al. among 202 women with UI, the most common type was found to be mixed UI (33.1%) followed by stress UI (31.6%) and urgency UI (13.3%)[14]. In our study, mean bladder volumes at first sensation and strong desire were not significantly different between the two groups while mean normal desire was significantly higher in patients with stress incontinence. Zaren et al. evaluated 99 women who had undergone urodynamic evaluation. Mixed, urgency and stress UI were reported in 35%, 33.3% and 31.1% of their patients respectively. They showed that mean bladder volumes at first sensation, normal desire and strong desire were significantly different between the three groups[15]. They also noted that mean maximal flow (Q max) was not significantly different between study groups. In the present study we also noted that Q max was comparable between patients with mixed UI and stress UI. Our results showed that urodynamic findings are poorly correlated with clinical findings. VLPP was not correlated with the results obtained during clinical evaluation including ESST results in patients with stress UI, however VLPP was correlated with ESST findings in women with mixed UI. In 1993, McGuire et al. introduced VLPP as a diagnostic test for stress UI[16]. It should be considered that VLPP measurement is not reliable in women who are not able to produce enough intra-abdominal pressure by Valsalva maneuver. Cough leak point pressure (CLPP) measurement may be an alternative in these patients. As proposed by McGuire et al., CLPP could be measured as an adjunct to VLPP and when the patient is not capable of producing Valsalva maneuver. CLPP was also not correlated with clinical findings (data not shown). Frequency of hypermobility did not differ between patients with mixed and stress UI. Furthermore hypermobility, detected during physical examination, was not correlated with VLPP values. We showed that UDS has a low specificity and is of limited value in confirming the diagnosis of either mixed or stress UI. Incontinence is a serious problem in women that affects all aspects of life including physical, psychological and social[17]. Along with efforts to treat these patients, physicians attempt to standardize the evaluation of such cases[15]. History, physical examination, urinalysis and cystourethroscopy are usually applied in evaluation of patients with urinary incontinence. Applying UDS in the assessment of women with UI is controversial. UDS is costly and might be associated with patient discomfort and serious adverse effects including urosepsis. Since the etiology of UI can be determined through clinical evaluation and considering the poor correlation between urodynamic variables and clinical findings, this modality seems to be of limited value in evaluation of patients with UI especially in the absence of a specific neurologic disorder. UDS has been considered as a useful modality in detecting occult stress UI, nevertheless, in a recent study occult stress UI was shown to be a poor urodynamic marker in predicting the development of post-hysterectomy stress UI.

CONCLUSION

In this prospective study we showed that UDS variables are poorly correlated with patients' symptoms and clinical findings. Despite a relatively high sensitivity, the specificity of urodynamic evaluation was low and it seems to be of limited value in the assessment of UI in female patients with no clear history of neurologic disorders and might not change therapeutic approaches. Further multi-center studies with larger sample size are necessary for evaluation of the clinical usefulness of UDS.

CONFLICT OF INTEREST

None declared.

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