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ORIGINAL PAPER

In women with incontinence, the need for pressure-flow study before surgery and abnormalities in the voiding phase. An up-to-date comment on the available problem accompanied by literature

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Summary *Objective: To investigate the differences between urodynamic findings and history in women with urinary incontinence before surgery and clarify the need for preoperative pressure-flow studies.*

Materials and methods: The medical records of 1018 women who underwent urodynamic examination for urinary incontinence between 2010 and 2015 were evaluated retrospectively. Stress (n = 442), urge (n = 334) and mixed (n = 242) were classified as type urinary incontinence according to urodynamics. The voiding phase findings of the patients were examined.

Results: The mean age of the patients was 47.85 ± 0.27 years. 18.4% of patients (n = 187) had voiding phase problems. Furthermore, this condition was seen in the most urge incontinence type urinary incontinence (35%). There was a statistically significant difference between the groups' voiding phase findings (p < 0.0001). The relationship between the patient's history and international consultation on incontinence questionnaire form scoring (ICIQ) and the urodynamics results showed no excellent correlation.

Conclusions: Voiding phase abnormalities are not uncommon in patients with urinary incontinence. They should be considered in the evaluation of patients. Voiding phase findings may show significant differences between urodynamic data and history. Besides, the data obtained with the questionnaire forms were significantly different from the findings obtained by urodynamics. Consequently, urodynamics may change pre-operative clinical decision.

KEY WORDS: *Urinary incontinence; Urodynamics; Voiding.*

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INTRODUCTION

Urinary incontinence is a common health condition that can affect about 50% of adult women and decrease life quality (1). This condition increases with age. Ten to twenty percent of women and up to 77% of women residing in nursing homes have urinary incontinence, yet only 25% attempt or receive treatment (2).

In the evaluation of incontinence patients, the history alone may be insufficient to diagnose and classification. Understanding lower urinary tract function and revealing the underlying pathophysiology is essential for the evaluation of these patients. Hence the information gained from urodynamics may help us. Performing urodynamics is controversial before surgical treatment of *stress urinary incontinence* (SUI) (3). According to the Cochrane library, urodynamics can change the clinical decision (4).

The NICE (*National Institute for health and care excellence*) guideline recommends urodynamic examination before stress urinary incontinence surgery (5). EAU guidelines do not recommend routinely carrying out urodynamics when offering treatment for uncomplicated urinary incontinence (6).

Incontinence mostly develops as a result of urine storage dysfunction and the incidence of *bladder outlet obstruction* (BOO) is low. For this reason, in daily practice, the only cystometry is usually performed in addition to history and physical examination. Since *pressure-flow studies* (PFS) are generally not implemented, the diagnosis of urinary voiding dysfunctions can be overlooked. Thus redundant surgical procedures and improper treatments can be applied to these patients.

To clarify whether SUI patients are always pure SUI and if these patients should be submitted to urodynamic before surgery to prevent incorrect surgical approach, we aimed to retrospectively investigate the abnormalities in the voiding phase of female patients who have undergone PFS for incontinence.

MATERIALS AND METHODS

Between January 2010 and June 2015, 1329 female patients aged 18-60 who had incontinence for at least six months and underwent urodynamics were evaluated retrospectively. Neurogenic lower urinary system dysfunction, active urinary infection, bladder stone, urethral stricture, pelvic radiation, pelvic surgery history, and patients who could not perform micturition in PFS were excluded from the study (311 patients).

Patients' demographic properties, urination diary, pad test, urine analysis and culture, urethral mobility (Q tip), urinary ultrasonography, post-voided residue, and urodynamic examination findings were retrieved. At filling cystometry, urinary incontinence triggered with Valsalva or coughing was accepted as stress type urinary inconti-

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nence, involuntary and inhibited detrusor contractions as urge urinary incontinence and the presence of both findings as mixed urinary incontinence.
At PFS, the inability of contraction at sufficient force or continuity resulting in prolonged or insufficient bladder discharge was considered underactive detrusor, Q_{max} > 12 ml/sec and Pdet Q_{max} > 20 cm H_2O was considered as BOO. Voiding characterized by an intermittent or staccato flow pattern due to involuntary and irregular pelvic floor contractions in neurologically healthful patients was evaluated as dysfunctional voiding (7, 8).
The patients were grouped as stress, urge, and mixed type urinary incontinence. Whether the voiding phase findings of the patients were normal or abnormal was checked. Urodynamics was applied according to the *International Continence Association* (ICS) (4).
Chi-square test was utilized to evaluate the results with Prism 5.0 (*GraphPad, USA*) program. P value < 0.05 was accepted as statistically significant.

Results

The average age of the patients was 47.85 ± 0.27 years.
Of the patients, 442 (43%) were evaluated as stress-type, 334 (32%) as urge-type, and 242 (25%) as mixed-type incontinence (Figure 1). Urethral stricture was diagnosed in 6% (n = 11) of those with excretory phase problems, dysfunctional voiding in 51% (n = 96) and underactive detrusor in 43% (n = 80). Urethral stricture and dysfunctional voiding and the rate of underactive detrusor were higher in patients with urge-type urinary incontinence. (47%) (Table 1).
Another finding was lack of good correlation between history and urodynamic filling phase results (Table 2). Similarly, data from *International Consultation on Incontinence Questionnaire* form (ICIQ) and findings from urodynamics are not fully concordant. There are considerable differences, especially in mixed urinary incontinence (Table 3).

Figure 1.
Incontinence types and percentages.

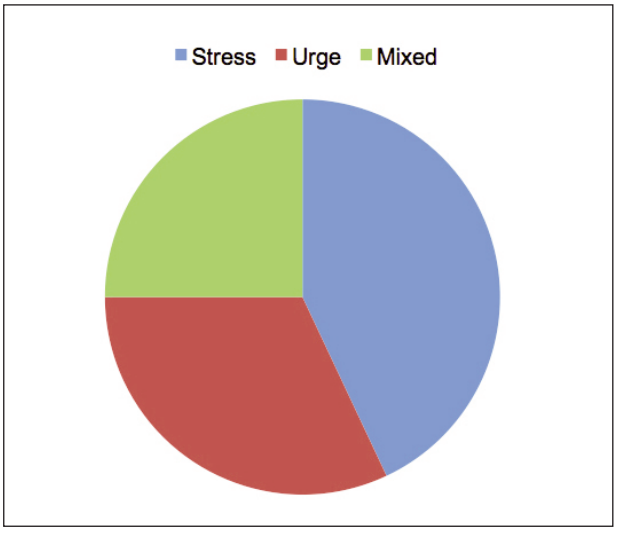

Table 1.
The voiding phase findings detected in the PFS.

Groups	Voiding phase findings	(n)	(%)
Stress urinary incontinence (n = 442)	Normal	403	91
	Urethral stricture	0	0
	Dysfunctional voiding	15	3
	Underactive detrusor	24	6
Urge type urinary incontinence (n = 334)	Normal	216	65
	Uretral stricture	9	3
	Dysfunctional voiding	71	21
	Underactive detrusor	38	11
Mixed type urinary incontinence (n = 242)	Normal	212	88
	Uretral stricture	2	1
	Dysfunctional voiding	10	4
	Underactive detrusor	18	7

PFS: Pressure-flow study.

Table 2.
Comparison of anamnesis and filling phase findings.

Anamnesis	Filling phase	(n)	(%)
SUI (n = 148)	SUI	(69)	47
	UUI	(37)	25
	MUI	(42)	28
UUI (n = 120)	SUI	(46)	38
	UUI	(44)	37
	MUI	(30)	25
MUI (n = 750)	SUI	(326)	43
	UUI	(266)	35
	MUI	(172)	22

SUI: Stress urinary incontinence; UUI: Urge urinary incontinence; MUI: Mixed urinary incontinence.

Table 3.
Comparison of ICIQ and filling phase findings.

Anamnesis	Filling phase	(n)	(%)
SUI (n = 123)	SUI	(60)	49
	UUI	(31)	25
	MUI	(32)	26
UUI (n = 116)	SUI	(50)	43
	UUI	(40)	35
	MUI	(26)	22
MUI (n = 779)	SUI	(325)	42
	UUI	(271)	35
	MUI	(183)	23

SUI: Stress urinary incontinence; UUI: Urge urinary incontinence; MUI: Mixed urinary incontinence; ICIQ: International consultation on incontinence questionnaire form.

Discussion

The bladder should be able to store urine at low pressure and at an appropriate volume, discharge the stored urine at once, and coordinate detrusor contraction and sphincter relaxation during voiding.
The knowledge regarding the togetherness of urinary voiding dysfunctions in female patients with incontinence in the literature is unclear. In 18.4% (n = 187), we found that patients with incontinence also have voiding phase problems simultaneously. Additionally urethral stricture was found in 6% (n = 11), dysfunctional voiding in 51% (n = 96), and underactive detrusor in 43% (n = 80) of these patients. We established that our outcomes were consistent with the literature (7).

If we come to underactive detrusor, we see that there are not enough studies and accepted objective criteria in female patients regarding underactive detrusor.
The existing nomograms about underactive detrusor have been used to describe male voiding dysfunction (8).
We defined that there were 7.9% (n = 80) underactive detrusor our patients.
Estimating the prevalence of BOO in women with incontinence is problematic in light of the existing literature.
A nomogram has been developed to diagnose BOO in women. However, due to the disparities in the pathophysiology of voiding problems compared to men, it has not been widely accepted, especially among urologists interested in this topic. Even so, it is possible to determine female bladder outlet obstruction with the support of pressure-flow studies and clinical symptoms simultaneously with video-urodynamics (8). It has been seen that even if in women with voiding difficulties and low urinary flow symptoms, the correlation between symptoms and urodynamics objective BUO is low, and it is not easy to reach a diagnosis in this way (9, 10). Another clinical entity that should be kept in mind is the possibility of the development of detrusor overactivity secondary to bladder outlet obstruction (7). As a matter of fact, in our study, the most common storage problem in patients with outflow obstruction was found to be urge type urinary incontinence. In addition, urethral stricture was found in 1.1% of the patients.
Although dysfunctional voiding is primarily diagnosed in the pediatric age group, it is one of the most common urinary voiding dysfunctions in women with lower urinary tract symptoms. In the literature, dysfunctional voiding was established in women with lower urinary tract symptoms and urodynamic examination with a rate of 9.6-12% (11, 12). Similarly, we noticed dysfunctional voiding was at a rate of 9.4% in our study.
It is a broad-spectrum non-neurogenic disorder involving dysfunction of the lower urinary tract and intestinal tract. Also, it is one of the most common urinary voiding dysfunctions in women with lower urinary tract symptoms.
We presented treatment options such as behavioral therapy (pelvic floor physiotherapy, biofeedback), medical therapy, cognitive therapy and sacral neuromodulation to patients who were diagnosed with this dysfunctional voiding.
Urodynamics after evaluation in the outpatient clinic changes the diagnosis by 57% and the choice of the treatment plan by 14%, and canalizes the surgical procedure (13-16). The best indicator for this is that 40% of overactive bladder patients are diverted for stress urinary surgery (8, 17). In another study, it has been indicated that the voiding phase is the most commonly used method to modify the surgical procedure in overactive bladder and intrinsic urinary sphincter deficiency (13).
In our study, we found out that the diagnosis changed in 18.4% of patients after PFS. Thus, we think that unnecessary surgery in 69/684 (10%) patients and inappropriate medical treatment in 47/334 (14%) patients with urinary incontinence have been prevented.
Limitations of our study are being a single-center study with retrospective design, lack of *Overactive Bladder Questionnaire* (OABQ) and ICIQ scoring in statistical data, no follow-up of the patients after surgery. Another matter of criticism could be that evaluations were not made by a single physician. We also admit that our results do not support a new finding, but we believe that our study with a high number of patients may contribute to clarify the controversial topic of necessity to perform urodynamics before surgery.

Conclusions

Urodynamics can provide clinicians with detailed and useful information about lower urinary tract function that may affect medical and surgical decisions. We recommend performing pressure-flow studies together with cystometry not to overlook the diagnosis of possible urinary voiding dysfunction in female patients with incontinence undergoing urodynamic examination. We believe that supporting these data with multi-center and prospective studies will significantly contribute to the literature.

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