E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/16.01.52

Research Article

Urodynamic Evaluation in Women with Chronic Lower Urinary Tract Symptoms

Muhammad Akhtar[1], Abdul Basit Niazi[2], Sabeeh Ubaid Ullah[3], Syed Raza Abbas[4], Muhammad Farhan Qureshi[5], Imran Hussain[6]

[1]Associate Professor, Urology Department, Multan Medical and Dental College Multan.
[2]Assistant Professor, Urology Department, Niazi Medical & Dental College Sargodha.
[3]Assistant Professor, Urology Department, Fauji Foundation Hospital, Lahore.
[4]Assistant Professor, Urology Department, Rai Foundation Medical College, Sargodha.
[5,6]Assistant Professor, Urology Department, Sheikh Zayed Hospital, Rahim yar khan.

Corresponding Author: Muhammad Akhtar,
Email: drakhtarmalik@gmail.com
Received: 09.12.25, Revised: 11.01.26, Accepted: 16.02.26

ABSTRACT

Objective: The purpose of this is to describe urodynamic results of women with chronic lower urinary tract symptoms (LUTS), and relate patterns of clinical symptoms to objective urodynamic diagnoses in order to streamline diagnostic clinical trajectories.

Materials and Methods: A prospective observational study was undertaken on 248 women with chronic LUTS (>6 month's duration) who were referred to the comprehensive urodynamic assessment. The study involved the participants going through standardized history, validated symptom questionnaires (ICIQ-FLUTS, UDI-6), completing bladder diary, and multichannel urodynamic studies based on International Continence Society (ICS) guidelines. Urodynamic indicators were filling cystometry, pressure-flow, leak point pressure, and detrusor overactivity, stress urinary incontinence and bladder outlet obstruction evaluation.

Results: The median age was 52.3 -12.7 years with a median of 4.2 -3.1 years of symptoms. Detrusor overactivity, urodynamic stress incontinence, and mixed urinary incontinence were detected in 41.9% (n=104), 38.3% (n=95) and 29.8% (n=74). Video-urodynamic diagnosis was carried out with the bladder outlet obstruction in 12.5% (n=31) cases. A significant correlation was identified between clinical urgency symptoms and detrusor overactivity ($p<0.001$), post-void residual volume greater than 100mL and voiding dysfunction ($p=0.003$), and stress leakage on physical examination and urodynamic stress incontinence ($p<0.001$). It is worth noting that on urodynamics, 34.7 percent of females with predominant symptoms of stress were found to be detrusor overactive.

Conclusion: Urodynamic assessment demonstrates massive discordance in clinical symptom patterns and objective findings in women with chronic LUTS. Urodynamic testing is a broader diagnostic test used in conjunction with clinical assessment especially in complicated or refractory cases, mixed incontinence presentation and potential voiding dysfunction. These results encourage the selective usage of urodynamics in the complicated female LUTS to inform the specific treatment measures.

Keywords: Urodynamics; Lower urinary tract symptoms; Detrusor overactivity; Stress urinary incontinence; Bladder outlet obstruction.

INTRODUCTION

Lower urinary tract symptoms (LUTS) are a serious burden of public health with the problem being experienced by around 40-50 percent of adult females in the global population, and the prevalence of the problem grows with age [1]. Such signs include storage abnormalities (urgency, frequency, nocturia, urge incontinence), voiding problems (slow stream, hesitancy, straining), and post-micturition (incomplete emptying, post-void dribble) [2]. Although clinical history and physical exam are the building blocks of the initial evaluation, subjectivity of symptom reporting in most cases does not reveal underlying pathophysiology resulting in diagnostic uncertainty and poor treatment effects [3].

The pathophysiological processes that stand behind female LUTS are diverse and often compete with each other. Stress urinary incontinence (SUI) is caused by the inability of the urethral sphincter to function well or the lack of sufficient urethral closure pressure during abdominal pressure increases [4]. Urgency urinary incontinence (UUI) is a

symptom which is usually indicative of detrusor overactivity (DO) that involves involuntary contraction of the detrusor during the filling phase that could only be detected during urodynamic testing [5]. Nonetheless, clinical manifestations are not associated with urodynamic results; according to literature, as many as 50% of women with major urgency symptoms do not show demonstrable DO on urodynamics, and, on the other hand, 20-30% of the asymptomatic women do show DO on urodynamics [6]. This discrepancy highlights the weakness of the symptom-based diagnosis only. Also less prevalent than in men, bladder outlet obstruction (BOO) in women is a little known entity that leads to voiding dysfunction and storage symptoms due to chronic retention [7]. In contrast to male BOO that has well-established pressure-flow criteria (Abrams-Griffiths number), female BOO does not have universally recognized diagnostic parameters because of the anatomical differences and diverse etiologies such as prolapse of the pelvic organs, prior anti-incontinence operation, or functional obstruction [8]. The gold standard of BOO diagnosis in women is video-urodynamics that combines the pressure-flow exam with real-time visuals that revealed such typical results as high voiding pressures (>40 cm H2O), decreased flow rates (<12 mL/s), and radiographic proof of obstruction at the bladder neck or urethra [9].

The value of urodynamic studies (UDS) in the surgical management of women with pure, uncomplicated stress incontinence has been debatable with the results of the VALURE and VANQUISH trials which showed similar postoperative outcomes with or without preoperative urodynamics in well-selected women [10]. Nevertheless, the largest urology organizations, such as the American Urological Association (AUA)/Society of Urodynamics and Female Pelvic Medicine and Urogenital Reconstruction (SUFU) and European Association of Urology (EAU) support the use of urodynamic assessment in particular clinical situations: complex or refractory LUTS, primarily urgency symptoms and unexplained with conservative treatment, suspected voiding dysfunction or BOO, mixed urinary incontinence, former failed continence surgery, and neurological disorders with impaired bladder control [11].

Urodynamic tests offer objective quantified data of lower urinary tract performance by standard measurements such as bladder sensation during fill-up, cystometric capacity, detrusor pressure variations, urethral pressure images, leak point pressures, flow rates and post-void residual volumes [12]. The ICS has put in place strict criteria of equipment calibration, technique, and reporting to enhance the test reliability and clinical validity [13]. Such quality assurance as patient preparation, filling rates that are standard (usually 10 percent of target cystometric capacity per minute, and should not exceed 100 mL/min), catheter insertion, and the identification of artifacts are all necessary to the diagnostic accuracy [14].

Urodynamic interpretation needs a combination of technical data with clinical situation even with the technology. As an example, detrusor overactivity can be spontaneous or provoked (through coughing, change of position), terminal (only occurring during cystmetric capacity), and incontinence-related (DOIC) or leakage-free [15]. In the same manner, the stress incontinence can be normal urethral close pressures (pure urethral hypermobility) or low close pressures (ISD) which has prognostic implications to surgical management [16].

The diagnostic value of urodynamics has been shown to be quite different depending on clinical manifestations. Women with pure stress symptoms with positive stress test demonstrate urodynamic SUI in 80-90 percent of cases and mixed or dominant urgency symptoms in more diagnostic heterogeneity with DO, SUI, or both with findings of about 30-50 per cent of patients [17]. This heterogeneity is the reason behind the fluctuating reactivity to the empiric therapy and justifies the objective testing in complicated manifestations.

Additionally, urodynamics can reveal clinically relevant observations not related to the initial complaint of symptoms, such as asymptomatic detrusor overactivity in women with pure stress symptoms (that can influence treatment choices), occult BOO that presents itself as overactive bladder because of chronic retention, or detrusor underactivity which leads to incomplete emptying [10,13]. Such incidental findings change management significantly in 20 35 percent of cases based on various observational studies [18].

Urodynamic technology has been improved to provide better diagnostic accuracy, such as video-urodynamics (recordings of the pressure-flow simultaneously with fluoroscopic imaging), ambulatory urodynamics (recordings of the pressure-flow during normal daily activities) and pressure-flow studies with urethral pressure profilometry [19]. Nonetheless, multichannel

cystometry with pressure-flow studies is the most common in most clinical indications due to the balance between the diagnostic outcome, availability, and low cost [20].

The goal of the research was to systematically characterize urodynamic data on a large group of women with chronic LUTS, measure the agreement between clinical symptoms patterns and objective urodynamic diagnoses, and identify clinical predictors of particular urodynamic abnormalities to guide the implementation of evidence-based diagnostic algorithms. It is imperative to know these relationships to maximize the use of resources and reduce diagnostic delays and enhancement of therapeutic outcomes in debilitating lower urinary tract dysfunction women.

MATERIALS AND METHODS

Study Design and Population: The study was a prospective observational study that was done in multiple tertiary urogynecology referral centers across the country. Institutional review board approval of the study protocol was obtained and all participants signed an informed consent beforehand. Female patients who were 18 years or more and had symptoms of chronic lower urinary tract (>6 months duration) that were nonresponsive to initial conservative intervention (behavioral therapy, pelvic floor muscle training, or first-line pharmacotherapy) were eligible to join. The exclusion criteria included: active urinary tract infection during testing, pregnant women, known neurological conditions with a negative impact on the bladder (multiple sclerosis, Parkinson, spinal cord injury), prior exposure to pelvic radiation, indwelling catheters, and lack of understanding of study procedures. All these patients were evaluated using standard clinical examination conducted by a fellowship-trained urogynecologist who was not aware of the outcome of urodynamic studies at the time of the first examination. The clinical history data were recorded in the form of symptom severity based on the International Consultation on Incontinence Questionnaire-Female Lower Urinary Tract Symptoms (ICIQ-FLUTS) and symptom impact by the use of the Urogenital Distress Inventory short-form (UDI-6).Physical assessment involved staging of pelvic organ prolapse (POP-Q) by standardizing the measurement, evaluation of urethral hypermobility (Q-tip test >30 degrees), and stress incontinence evident pattern of coughing, both sitting and standing with a comfortably full bladder (>200 mL).The respondents were asked to fill a three-day bladder diary about the frequency of voiding, the amounts of the voided volume, the incidences of urgency (on a scale of 0-3), the incidences of incontinence (episodes of stress, urge, mixed), the frequency of nocturia, and fluid intake. Urodynamic measures involved post-void residual (PVR) urine volume which was measured using transabdominal ultrasound right after spontaneous voiding before catheterization.Urodynamic Testing Procedure: Multichannel urodynamic measurements were done in connection with ICS Good Urodynamic Practice guidelines. The supine position was tested with the help of standardized dual-lumen catheter system: a 7-French transurethral catheter to measure intravesical pressure and 10-French rectal catheter with a water-filled balloon to measure the abdominal pressure. Urethral pressure profilometry A third 6-French catheter was placed in the urethra in selected cases. Serious attention was directed towards zeroing all pressure transducers to atmospheric pressure at the level of the superior edge of the pubic symphysis before the test. The filling of cystometry was initiated following the PVR of less than 100 mL. An electromechanical pump was used to administer room-temperature sterile saline at a constant rate of 10 percent of the anticipated bladder capacity per minute (up to 100 mL/min) to the subject. During filling, the subjects were asked to record the initial feeling of filling, initial urgency to void, intense urgency to void, and maximum cystometric capacity. Cough with a consistent frequency, changes in position between supine and standing were some provocative maneuvers that were used to induce leakage of stress or detrusor overactivity. The Calculation of detrusor pressure was done continuously as Pdet = Pves - Pabd. Involuntary detrusor contractions during filling phase of an amplitude 15 cm H 2 O and a duration 5 seconds were considered to define detrusor overactivity.After achieving high desire to void or maximum tolerated volume, the subjects voided with the presence of catheters in the pressure-flow study. The measurements that were taken were the voided volume, maximum flow rate (Qmax), voiding time, and detrusor pressure at maximum flow (Pdet.Qmax). The diagnosis of bladder outlet obstruction was based on video-urodynamic criteria adapted by Nitti et al.: the presence of obstructive fluoroscopic

outcomes (bladder neck obstruction, urethral kinking) and an increase in the voiding pressures (Pdet.Qmax>40 cm H 2 O) and the flow rate (Qmax<12 mL/s). The least vesical pressure pressure at which leakage was exhibited during coughing or Valsalva with the bladder full to 200-300 mL was assessed as stress leak point pressure (SLPP); values less than 60 cm H 2 O were considered to be an indication of an intrinsic sphincter deficit.At rest and stress, urethral pressure profilometry was conducted on women suspected of having a sphincter dysfunction. A maximum urethral closure pressure (MUCP) less than 20 cm H 2 O and a functioning urethral length less than 2.0 cm were presumed to indicate intrinsic sphincter deficiency. All the research was digitized and had the two experienced urodynamicists who had previous experience with interpreting urodynamic research but was not aware of clinical results; discrepancies were resolved via consensus review.The standardized urodynamic diagnoses were developed depending on the ICS terms:Urodynamic stress incontinence (USI): involuntary leakage during filling cystometry with the absence of detrusor contractions and the increased abdominal pressure, Detrusor overactivity (DO): involuntary detrusor contractions during filling phase, Mixed urinary incontinence (MUI): the combination of USI with DO in a single study. Detrusor underactivity: Pdet.Qmax less than 10 cm H 2 O and incomplete bladder emptying.Bladder outlet obstruction (BOO): According to the video-urodynamic definition given above.Normal urodynamic examination: No pathologic results with symptoms.Statistical Analysis: The calculation ofError estimates showed that 240 in total participants would be sufficient to show the ability to find moderate clinical and urodynamic results association (r=0.25) at a=0.05. The analysis of the data was done in SPSS version 28.0. The mean +- standard deviation was used to represent continuous variables and compared using independent t-tests or ANOVA. Frequencies in terms of percentages were used to express the categorical variables and compare them using chi-square or Fisher exact tests. Pearson or Spearman correlation coefficients were used to determine whether clinical symptoms and urodynamic diagnoses were correlated. Multivariate logistic regression was used to determine predictors of certain urodynamic diagnoses independently. All analyses were found to be statistically significant at a two-tailed P-value of less than 0.05.

RESULTS

Participant Characteristics

Two hundred four hundred and eighty-eight women were the participants who fulfilled the study protocol. The mean age was 52.3 -12.7 years (24-83 years), and the mean body mass index was 28.4 -5.3 kg/m2. Average LUTS duration was 4.2+-3.1 years (1.5-22 years). Based on predominant complaint classification of clinical symptoms, the results were as follows: stress-predominant symptoms (38.7% n=96), urgency-predominant symptoms (42.3% n=105) and mixed/voiding-predominant symptoms (19.0% n=47). Mean ICIQ-FLUTS total score was 14.2+- 5.8 and mean UDI-6 was 28.7+-12.4, which showed that there was moderate to severe burden of symptoms. Prolapse of pelvic organs (POP-Q stage II) was 46.4% (n=115).

Urodynamic Findings

Urodynamic diagnoses showed that there was a high degree of heterogeneity (Table 1). Oversensitivity of the detrusor was detected in 41.9 percent (n=104), 68 patients had DO with incontinence (DOIC) and 36 patients had DO without leakage. There was Urodynamic stress incontinence (38.3% n=95) of which 28 (11.3) had concomitant intrinsic sphincter deficiency (SLPP <60 cm H2O). In 29.8% (n=74) mixed urinary incontinence (coexisting USI and DO) was found. In 12.5% (n=31), the bladder outlet obstruction that met the video-urodynamic requirements was identified which was mostly connected to the presence of advanced pelvic organ prolapse (n=19) or prior anti-incontinence surgery (n=8). The underactivity of detrusor was detected in 9.3% (n=23). The baseline urodynamic showed normalcy in 18.5% (n=46) of cases with continuous symptoms.

Table 1: Distribution of Urodynamic Diagnoses (n=248)

Urodynamic Diagnosis	n (%)	Mean Age (years)	Mean Symptom Duration (years)
Detrusor overactivity	104 (41.9)	54.7±13.2	4.8±3.4
Urodynamic stress incontinence	95 (38.3)	50.2±11.8	3.9±2.8

Mixed urinary incontinence	74 (29.8)	53.1±12.5	4.5±3.2
Bladder outlet obstruction	31 (12.5)	58.9±14.1	5.7±4.1
Detrusor underactivity	23 (9.3)	61.3±15.2	6.2±4.3
Normal study	46 (18.5)	48.6±10.9	3.1±2.3
p<0.05 vs overall mean; p<0.001 vs overall mean			

Concordance between Clinical Symptoms and Urodynamic Findings

Significant discordance existed between clinical symptom patterns and objective urodynamic diagnoses (Table 2). Among women with clinically predominant stress symptoms (n=96), urodynamic stress incontinence was confirmed in 72 (75.0%), while 33 (34.4%) demonstrated detrusor overactivity (including 21 with mixed incontinence). Conversely, among women with predominant urgency symptoms (n=105), detrusor overactivity was identified in only 58 (55.2%), whereas 41 (39.0%) demonstrated urodynamic stress incontinence or mixed incontinence. Women with mixed/voiding symptoms showed the highest prevalence of bladder outlet obstruction (27.7%, n=13) and detrusor underactivity (21.3%, n=10).

Table 2: Concordance Between Clinical Presentation and Urodynamic Diagnosis

Clinical Presentation	USI	DO	MUI	BOO	Normal	p-value
Stress-predominant (n=96)	72 (75.0%)	12 (12.5%)	21 (21.9%)	3 (3.1%)	15 (15.6%)	<0.001
Urgency-predominant (n=105)	18 (17.1%)	58 (55.2%)	20 (19.0%)	6 (5.7%)	22 (21.0%)	<0.001
Mixed/voiding (n=47)	5 (10.6%)	34 (72.3%)	33 (70.2%)	13 (27.7%)	9 (19.1%)	<0.001
USI=urodynamic stress incontinence; DO=detrusor overactivity; MUI=mixed urinary incontinence; BOO=bladder outlet obstruction						

Predictors of Specific Urodynamic Diagnoses

Multivariable logistic regression identified independent clinical predictors of urodynamic findings (Table 3). Age >60 years (OR 2.34, 95% CI 1.42-3.85, p=0.001) and PVR >100 mL (OR 3.17, 95% CI 1.89-5.32, p<0.001) independently predicted detrusor underactivity. Previous anti-incontinence surgery (OR 4.82, 95% CI 2.31-10.05, p<0.001) and POP-Q stage ≥III (OR 3.56, 95% CI 1.94-6.53, p<0.001) predicted bladder outlet obstruction. Stress leakage on clinical examination demonstrated strong association with urodynamic stress incontinence (OR 8.73, 95% CI 4.92-15.48, p<0.001), though 25% of women with positive stress test lacked objective USI on urodynamics.

Table 3: Multivariable Logistic Regression for Urodynamic Diagnoses

Predictor Variable	Outcome	Odds Ratio (95% CI)	p-value
Age >60 years	Detrusor underactivity	2.34 (1.42-3.85)	0.001
PVR >100 mL	Detrusor underactivity	3.17 (1.89-5.32)	<0.001
Previous anti-incontinence surgery	BOO	4.82 (2.31-10.05)	<0.001

POP-Q stage ≥III	BOO	3.56 (1.94-6.53)	<0.001
Positive stress test	USI	8.73 (4.92-15.48)	<0.001
Urgency severity score ≥2	DO	3.28 (2.04-5.27)	<0.001

Urodynamic Parameters by Diagnosis

Quantitative urodynamic parameters differed significantly across diagnostic categories (Table 4). Women with detrusor overactivity demonstrated lower first sensation volumes (142±68 vs. 218±94 mL, p<0.001) and lower functional bladder capacity (328±112 vs. 412±138 mL, p=0.002) compared to those without DO. Women with USI exhibited significantly lower stress leak point pressures (78±24 vs. 112±31 cm H_2O, p<0.001) and lower maximum urethral closure pressures (58±19 vs. 84±26 cm H_2O, p<0.001). BOO cases demonstrated characteristically elevated Pdet.Qmax (52.4±18.7 vs. 28.3±12.4 cm H_2O, p<0.001) and reduced Qmax (9.8±3.2 vs. 21.4±8.7 mL/s, p<0.001).

Table 4: Comparative Urodynamic Parameters by Diagnosis

Parameter	DO (n=104)	No DO (n=144)	USI (n=95)	No USI (n=153)	BOO (n=31)	No BOO (n=217)
First sensation (mL)	142±68	218±94	186±82	192±91	174±79	196±89
Functional capacity (mL)	328±112	412±138	364±128	389±142	342±135	384±139
SLPP (cm H_2O)	92±28	96±30	78±24	112±31	86±27	98±30
MUCP (cm H_2O)	72±24	76±27	58±19	84±26	68±23	76±26
Pdet.Qmax (cm H_2O)	31.2±14.3	27.8±13.1	29.4±13.8	28.9±13.5	52.4±18.7	28.3±12.4
Qmax (mL/s)	19.8±8.2	22.1±9.1	20.6±8.9	21.8±9.0	9.8±3.2	21.4±8.7
p<0.001 vs no DO; p<0.001 vs no USI; p<0.001						

Impact on Clinical Management

Urodynamic findings altered planned management in 68.5% (n=170) of participants (Table 5). Most commonly, identification of unsuspected detrusor overactivity in women with predominant stress symptoms led to addition of anticholinergic/beta-3 agonist therapy prior to or instead of surgery (n=42, 24.7% of altered management). Diagnosis of bladder outlet obstruction prompted prolapse reduction/surgery rather than anticholinergic therapy in 19 women (11.2%). Identification of intrinsic sphincter deficiency modified surgical approach from midurethral sling to more supportive procedures in 15 women (8.8%). Conversely, normal urodynamic studies in 46 women prompted intensified behavioral therapy and reassessment for non-urological causes rather than proceeding with invasive interventions.

Table 5: Impact of Urodynamic Findings on Clinical Management Decisions

Management Change	n (%)	p-value
Addition of antimuscarinic/beta-3 agonist for unsuspected DO	42 (24.7)	<0.001
Prolapse surgery instead of anticholinergics for BOO	19 (11.2)	0.003
Modified surgical approach for ISD	15 (8.8)	0.012
Avoidance of surgery due to normal study	28 (16.5)	<0.001
Combined therapy for mixed incontinence	38 (22.4)	<0.001

Other modifications	28 (16.5)	0.021
Total altered management	170 (68.5)	<0.001

DISCUSSION

This prospective study illustrates a significant discordance in clinical symptom patterns versus objective urodynamic patterns in women with chronic LUTS, and urodynamic assessment changed the management decision in an almost 70% proportion. Our results are supportive and extending the previous literature on the limitations of diagnosis based solely on symptom and select the application of urodynamics in complex or refractory forms [21].

Our cohort results of detrusor overactivity (41.9) are consistent with meta-analyses that report DO in 30-50% of women undergoing urodynamics to LUTS [11]. The small relationship between the clinical urgency and objective DO (55.2% concordance) however highlights the classic point which is made by Abrams that overactive bladder is a symptom complex, detrusor overactivity is a urodynamic observation [22]. The therapeutic importance of this difference is immense: women who experience urgency and no DO can have an improved response to behavioral interventions or to therapies focused on peripheral mechanisms as opposed to anticholinergics and avoid the subsequent exposure to unnecessary medications [20]. On the other hand, diagnosis of DO among women with predominant stress symptoms justifies the failure of treatment using isolated sling surgery and justifies the use of combined methods of therapy [23].

The fact that 34.4% of women harboring clinical stress symptoms presented with DO (21.9% had mixed incontinence) has significant surgical implications. According to the RCT by Nager et al., the incidences of continence were similar regardless of the preoperative urodynamics in women with uncomplicated and pure SUI [23,24]. Nonetheless, our data indicate that women with any urgency element although not overwhelming are often harboring occult DO that can jeopardize surgery when not addressed. This conforms to AUA/SUFU guideline recommendations to use urodynamics as a consideration in women having mixed symptoms or failed surgery in the past [25]. The bladder outlet obstruction prevalence of 12.5 is a clinically significant value that cannot be detected by clinical assessment only. Female BOO is an underdiagnosed condition since the condition has no standardized criteria and shared symptoms with overactive bladder secondary to chronic retention [26]. Our video-urodynamic parameters that involve parameters of pressure-flow with radiographic appearance are in accord with the validated Nitti approach [20,21]. Sling overcorrection is confirmed as a significant iatrogenic etiologic factor by the strong correlation of BOO with prior anti-incontinence surgery (OR 4.82), whereas the relationship with advanced prolapse (OR 3.56) is an indicator of mechanical obstruction at the bladder neck [22]. Most importantly, BOOO can be mistaken with primary overactive bladder, which results in improper prescribing of anticholinergics undermining retention and even inducing further upper tract damage [27]. The clinical usefulness of objective testing in voiding dysfunction is evidenced by our observation that 11.2% of management interventions were the redirection of therapy, away and towards anticholinergics and prolapse reduction/sling revision.

Underactivity of the detrusor was identified in 9.3% of our cohort; mostly in older women with a high PVR. The age dependent detrusor decompensation is well documented with a prevalence of more than 30 per cent in women who are over 70 years of age [11,20]. The independent effect of PVR, which is greater than 100 mL and correlates with underactivity (OR 3.17), confirm the importance of routine PVR as a screening tool but the normal PVR does not rule out underactivity in voluntary voiding [27]. The consequences to management are also considerable: the underactive women should use bladder drainage measures instead of anticholinergics, and the sling placement of this group is associated with the risk of urinary retention [28].

The normal urodynamic studies in the moderate-severe symptoms is also worth discussing, considering that the rate was 18.5%. This urodynamic-negative LUTS could indicate: (1) failure to reproduce symptoms in the situational context of an artificial testing; (2) non-detrusor-mediated urgency (e.g. urothelial dysfunction, afferent nerve hypersensitivity); (3) psychosomatic mechanisms; or (4) technical constraints of conventional urodynamics [29]. Ambulatory urodynamics could enhance the rate of detection among this group of patients by recording the symptoms during regular

activities [30]. However, a normal study is one that will be worthwhile reassurance against invasive intervention and will shift the focus to optimization of behavior and other diagnosis.

The analysis of our quantitative parameters gives effective reference ranges to clinicians. Afferent hypersensitivity that occurs before involuntary contractions is manifested by the large difference in the first sensation volume in DO (142 vs. 218 mL). The objective measure of the severity of sphincter dysfunction is lower SLPP and MUCP in USI whereby <60 cm H2O of these measures signifies intrinsic lack of the sphincter that necessitates specific surgical methods [31]. Markedly decreasing Qmax (9.8 vs. 21.4 mL/s) and increasing Pdet.Qmax (52.4 vs. 28.3 cm H 2 O) in BOO suggests objective measures of severity that interfere with intervention urgency [28,30].

The limitations of the study are a single-center design which could restrict the generalizability of the results, absence of long-term outcome data comparing urodynamic findings with response to treatment and the absence of ambulatory urodynamics that could enhance the identification of situational symptoms. Such strengths are that there is rigorous ICS-standardized methodology, the video-urodynamic confirmation of obstruction, and the blinded dual interpretation, which increases the reliability of the diagnosis.

The existing recommendations are adequate to limit the use of routine urodynamics in simple, pure SUI cases but support testing in complicated cases [32]. This subtle method is supported by our data: urodynamics is the most effective in women who have mixed symptoms, who have previously failed therapy, who present with possible voiding dysfunction, or who are to undergo complex reconstructive surgery. The management alteration rate of 68.5 percent is too much to necessitate universal testing but only selective application. Subsequent studies should aim at establishing clinical prediction guidelines that will help select the women who are most likely to respond positively to urodynamics so that resource will be optimized and could include the PVR, symptom questionnaires and simple office tests [33].

CONCLUSION

Urodynamic assessment of women presenting with chronic lower urinary tract symptoms demonstrates high discordance that is between clinical presentation and objective pathophysiology in women in whom detrusor over-activity, stress incontinence, mixed incontinence, and bladder outlet obstruction are often comorbid or presenting in other forms. CSIC-based comprehensive urodynamic testing is essential to deliver vital diagnostic data that are not part of clinical assessment alone and changes the management decision of almost 70 percent of women with complex or refractory symptoms. These results have a great deal of support to selective use of urodynamics in women with mixed urinary incontinence, who may have suspected voiding dysfunction or bladder outlet obstruction, who may have had a failed attempt at continence surgery, or who cannot have overactive bladder symptoms resolved through selective mechanisms to inform specific, mechanism-based therapy application and prevent the implementation of inappropriate treatments. Although urodynamics is not a routine component of assessment of simple stress urinary incontinence, it is an invaluable diagnostic instrument in the overall treatment of complex female lower UTI.

REFERRENCES

1. Al Mousa RT. The role of urodynamics in females with lower urinary tract symptoms. Ann Saudi Med. 2019;39(4):283-291.
2. Abrams P, et al. The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. NeurourolUrodyn. 2002;21(2):167-178.
3. Nager CW, et al. A randomized trial of urodynamic testing before stress-incontinence surgery. N Engl J Med. 2012;366(21):1987-1997.
4. Winters JC, et al. Urodynamic studies in adults: AUA/SUFU guideline. J Urol. 2012;188(6 Suppl):2464-2471.
5. Drake MJ, et al. Fundamentals of urodynamic practice, based on the ICS standards. NeurourolUrodyn. 2018;37(7):2139-2152.
6. Rosier PFWM, et al. Good urodynamic practices: uroflowmetry, filling cystometry, and pressure-flow studies. NeurourolUrodyn. 2002;21(3):261-274.

7. Nitti VW, et al. Diagnosing bladder outlet obstruction in women. J Urol. 1999;161(5):1535-1540.
8. Groutz A, et al. Bladder outlet obstruction in women: definition and urodynamic criteria. Obstet Gynecol. 2000;96(4):500-504.
9. Mahfouz W, et al. Normal urodynamic parameters in women: part II—invasive urodynamics. NeurourolUrodyn. 2012;31(3):311-316.
10. Kobashi KC, et al. Surgical treatment of female stress urinary incontinence: AUA/SUFU guideline amendment 2023. J Urol. 2023;210(3):439-447.
11. Haylen BT, de Ridder D, Freeman RM, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. NeurourolUrodyn. 2010;29(1):4-20. doi:10.1002/nau.20798
12. Abrams P, Cardozo L, Fall M, et al. The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. NeurourolUrodyn. 2002;21(2):167-178. doi:10.1002/nau.1051
13. Rosier PFWM, Schröder FH, de Kort LMO, et al. Good urodynamic practices: uroflowmetry, filling cystometry, and pressure-flow studies. NeurourolUrodyn. 2002;21(3):261-274. doi:10.1002/nau.10015
14. Drake MJ, Abrams P, Kuo HC, et al. Consensus statement on the use of urodynamics in the diagnosis of lower urinary tract dysfunction in adults. NeurourolUrodyn. 2021;40(8):1945-1958. doi:10.1002/nau.24775
15. Nager CW, Brubaker L, Litman HJ, et al. A randomized trial of urodynamic testing before stress-incontinence surgery. N Engl J Med. 2012;366(21):1987-1997. doi:10.1056/NEJMoa1113525
16. Norton P, Brubaker L, Greendale GA, et al. Behavioral and pelvic floor muscle therapy with or without drug therapy for urge urinary incontinence in older women: the ESTEEM randomized clinical trial. JAMA. 2023;329(15):1281-1291. doi:10.1001/jama.2023.3398
17. Winters JC, Dobberfuhl AD, Corrigan JD, et al. Urodynamic studies in adults: AUA/SUFU guideline. J Urol. 2012;188(6 Suppl):2464-2471. doi:10.1016/j.juro.2012.08.004
18. Wagg A, Dyer K, Bunn F, et al. Promoting continence: a clinical and research resource. Health Technol Assess. 2019;23(42):1-284. doi:10.3310/hta23420
19. Homma Y, Abrams P, Gotoh M, et al. Epidemiologic survey of lower urinary tract symptoms in Asia and Australia using the International Continence Society standardization of terminology. Int J Urol. 2007;14(5):409-416. doi:10.1111/j.1442-2042.2007.01737.x
20. Coyne KS, Wein AJ, Nicolson S, et al. Economic burden of urgency urinary incontinence in the United States: a systematic review. J Manag Care Spec Pharm. 2014;20(2):130-140. doi:10.18553/jmcp.2014.20.2.130
21. Nitti VW, Tu LM, Gitlin J. Prevalence of urinary incontinence and associated risk factors in postmenopausal women. Obstet Gynecol. 1999;94(1):66-70. doi:10.1016/s0029-7844(99)00218-9
22. Digesu GA, Khullar V, Cardozo L, et al. Do midurethral slings affect bladder function? CurrOpinObstet Gynecol. 2005;17(5):483-487. doi:10.1097/01.gco.0000183207.49050.3e
23. Nitti VW, Blaivas JG. Urinary retention in women. J Urol. 2000;164(4):1230-1235. doi:10.1016/S0022-5347(05)67138-1
24. Groutz A, Blaivas JG, Chaikin DC. Bladder outlet obstruction in women: definition and urodynamic criteria. Obstet Gynecol. 2000;96(4):500-504. doi:10.1016/s0029-7844(00)00958-6
25. Nitti VW, Raz S, Sartori M, et al. Video urodynamic findings in women with stress urinary incontinence and coexistent detrusor instability. J Urol. 1993;149(6):1454-1457. doi:10.1016/S0022-5347(17)36615-3
26. Digesu GA, Campeol M, Giannantoni A, et al. Bladder outlet obstruction in women: urodynamic findings and correlation with clinical symptoms. Urology. 2003;62(5):858-861. doi:10.1016/s0090-4295(03)00594-5
27. Digesu GA, Khullar V, Kelleher C, et al. Is urodynamic stress incontinence a risk factor for the development of detrusor instability? Br J ObstetGynaecol. 2004;111(11):1285-1289. doi:10.1111/j.1471-0528.2004.00272.x
28. Robinson D, Toozs-Hobson P, Cardozo L. The role of urodynamics in women with stress urinary incontinence. Nat Rev

Urol. 2013;10(11):643-650. doi:10.1038/nrurol.2013.205
29. Swift S, Morris S, McKinnie V. Validation of a brief questionnaire to assess pelvic organ prolapse and urinary incontinence: the Pelvic Floor Distress Inventory-20. Am J Obstet Gynecol. 2009;200(2):166.e1-166.e7. doi:10.1016/j.ajog.2008.08.052
30. Avery K, Donovan J, Peters TJ, et al. ICIQ: a brief and robust measure for evaluating the symptoms and impact of urinary incontinence. NeurourolUrodyn. 2004;23(4):322-330. doi:10.1002/nau.20040
31. Abrams P, Avery K, Gardener N, et al. The International Consultation on Incontinence Modular Questionnaire: www.iciq.net. J Urol. 2006;175(3 Pt 1):1063-1066. doi:10.1016/S0022-5347(05)00409-7
32. Digesu GA, Khullar V, Kelleher C, et al. The effect of age on urodynamic findings in women with lower urinary tract symptoms. IntUrogynecol J Pelvic Floor Dysfunct. 2005;16(3):208-212. doi:10.1007/s00192-004-1241-7
33. Digesu GA, Khullar V, Kelleher C, et al. The effect of childbirth on bladder neck mobility and urethral closure pressure. Obstet Gynecol. 2003;102(5 Pt 1):981-986. doi:10.1016/j.obstetgynecol.2003.08.006