Original Article

Office cystometry in a resource-constrained setting: Spectrum of diagnoses and correlation with QUID

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ABSTRACT

Background: Office cystometry is an appropriate technology alternative to urodynamics, especially in resource-poor settings. The combination of a validated screening tool such as the Questionnaire for Urinary Incontinence Diagnosis (QUID) and office cystometry stands as the gold standard in the evaluation of urinary incontinence, where urodynamics is not available.

Objectives: This study aimed to determine the spectrum of urinary incontinence diagnoses using a combination of urogynecological examination and office cystometry among women in a resource-constrained sub-Saharan African setting and to correlate this with their QUID diagnoses.

Methods: Sixty consenting women who had urinary incontinence diagnosed with QUID were recruited from a related study. The cough stress test was performed to elicit stress incontinence. Standard digital and speculum examinations were performed. Postvoid residual urine volume was determined by catheterization. Simple cystometry was performed to detect detrusor overactivity. Using urogynecological examination and simple cystometry as the gold standard, sensitivity, specificity, positive, and negative predictive values were calculated for QUID.

Results: The spectrum of diagnoses made using urogynecological examination and office cystometry included no incontinence 13 (21.7%), urge incontinence 23 (38.3%), stress incontinence 18 (30.0%), mixed incontinence 5 (8.3%), and overflow incontinence in 1 (1.7%) woman, respectively. Using this as the gold standard, QUID demonstrated sensitivity of 87.0%, 55.6%, and 60.0% for urge, stress, and mixed incontinence, respectively, with corresponding specificity of 73.0%, 81.0%, and 83.6%, respectively.

Conclusion: Urogynecological examination and office cystometry identified stress, urge, mixed, and overflow urinary incontinence in the study population. Overall, good correlation existed between the QUID and office cystometric diagnoses.

Key words: Cystometry; diagnosis; incontinence; urinary; urodynamics; screening.

Introduction

Urinary incontinence constitutes a major source of health-related poor quality of life in affected women worldwide.[1,2] Although nonfistuluous urinary incontinence is known to be less prevalent among Black women than their Caucasian counterparts, recent studies in Nigeria have revealed a significant prevalence (5.2%–7.2%) of the condition even among indigenous Black women.[3-5] The standard management of urinary incontinence is currently hinged on accurate diagnosis of the specific type of urinary

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incontinence and its underlying cause. This is best achieved using a combination of a validated screening tool with urogynecological examination and appropriate urodynamic testing.[6,7]

Urodynamics is currently considered mandatory prior to any surgical intervention for urinary incontinence in various guidelines including those of the National Institute for Health and Care Excellence/Royal College of Obstetricians and Gynaecologists and American College of Obstetricians and Gynaecologists (NICE/RCOG and ACOG).[6,7] However, in resource-constrained settings such as Nigeria, urodynamics is usually not available, ostensibly because of the high cost and technology-intensive nature of the equipment and consumables. Fortunately, a simple urodynamic innovation that embodies low cost and appropriate technology for resource-constrained settings does exist, in the form of simple (office) cystometry.[8,9] It is used to assess bladder sensation, capacity, and compliance, with a high degree of correlation with urodynamics. Office cystometry is simple and demonstrates high sensitivity, specificity, and positive predictive value (PPV) especially in the diagnosis of detrusor overactivity. In fact, when combined with urogynecological examination, it achieves high accuracy in the diagnosis of stress incontinence and detrusor overactivity.[9,10]

There is a dearth of studies documenting the use of this appropriate technology procedure in resource-constrained settings and this is rather surprising considering that office cystometry is a very old procedure. This study was consequently designed to describe the types and burden of urinary incontinence among a cohort of women in a resource-constrained setting (Ile-Ife, Nigeria) using a combination of urogynecological examination and office cystometry. The findings were further compared with the urinary incontinence type determined by the Questionnaire for Urinary Incontinence Diagnosis (QUID)[11] among the same subjects.

Methods

This study was a spin-off from a previous larger study that determined the prevalence and pattern of urinary incontinence and opportunistic screening for it among women attending a general out-patient clinic in southwestern Nigeria, the details of which are fully described elsewhere.[4] In all, 65 women who had urinary incontinence diagnosed with QUID during screening in the aforementioned study were counseled for participation in the present descriptive study. Five of them, however, refused consent and were therefore excluded, whereas the remaining 60 who gave informed consent were all recruited and completed the study. Ethical approval was obtained from the institution's research and ethics committee (protocol number ERC/2013/12/05) and written informed consent was obtained from the subjects prior to inclusion in the study.

Each subject had questionnaire screening, urogynecological examination, and office cystometry. The QUID used for screening in this study is a reliable instrument which was developed to classify type of incontinence based on symptoms.[11] It consists of six questions; the first three of which are related to stress urinary incontinence, while the last three relate to urge urinary incontinence. These questions enquire about urinary loss and how frequently it occurred. Each question consists of six items which range from 0 (*none at all*) to 5 (*all of the time*). These scores are added together, and the possible range of scores is from 0 to 15. Women with stress incontinence are identified with an optimal subscale cut-off value of 4 and above, while urge incontinence is diagnosed with an optimal subscale score of 6 and above. Mixed urinary incontinence is considered if both subscale scores are above the critical cut-off values. Based on the outcome of QUID, the women were categorized into four groups as follows: (i) no urinary incontinence, (ii) stress urinary incontinence, (iii) urge urinary incontinence, and (iv) mixed urinary incontinence.

For each of the subjects, urogynecological examination was commenced with a comfortably full bladder. The cough stress test was performed to elicit stress incontinence. Afterward, standard digital and speculum examinations were performed. The postvoid residual urine volume was then determined by catheterization. Thereafter, office cystometry was commenced by attaching the cylinder (plunger removed) of a sterile 50-mL syringe to the bladder catheter (Latex Foley's catheter). Holding the syringe up at about 15 cm above the urethral meatus, sterile normal saline was instilled in 50-mL aliquots under the effect of gravity. The total volume of the fluid that had been instilled at the point when the patient experienced the first desire to void was noted. Fluid was thereafter instilled in 25-mL aliquots until the subject either expressed an uncontrollable desire to void or oscillations were seen in the fluid column within the 50-mL syringe, signifying detrusor contractions. The volume at which this occurred was noted. The catheter was then removed, and the patient was allowed to void. Postvoid residual volume >200 mL suggests urinary retention. The first desire to void is normally experienced at 150–200 mL, while the normal bladder capacity is >400 mL. Severe urgency or bladder contraction at <300 mL suggests detrusor overactivity.

All the findings were recorded in a purpose designed study proforma and subsequently transferred into an electronic

spreadsheet. Data cleaning and statistical analysis were done using SPSS version 20. Means and standard deviations were generated for continuous variables, while frequencies and proportions were derived for categorical data. The QUID diagnoses were compared against those of a combination of urogynecological examination and office cystometry, using the latter as the gold standard. From this comparison, the sensitivity, specificity, PPV, and negative predictive values (NPVs) of QUID were calculated for the diagnosis of stress, urge, and mixed incontinence, respectively.

Results

The baseline characteristics of the study participants are shown in Table 1. Their mean age was 48.4 ± 16.3 years with a range of 23–89 years. Only three (5%) of the subjects were nulliparous. The remaining (95%) had relatively high parities with a median parity of four and almost all their deliveries had been vaginal; except for two women with history of caesarean delivery. None of the subjects had instrumental vaginal delivery. Among the 60 women with QUID-diagnosed urinary incontinence, 30 (50.0%) were classified by QUID as having urge incontinence, 18 (30.0%) as having stress incontinence, and 12 (20.0%) as having mixed incontinence.

Subsequent evaluation of the study subjects was done using a combination of urogynecological examination and office cystometry. The result is shown in Table 2. Thirteen subjects who had QUID diagnosis of urinary incontinence were found to have no demonstrable abnormality on urogynecological examination and office cystometry; hence, QUID demonstrated a crude false-positive rate of 21.7%. One patient was also diagnosed at cystometry as having overflow urinary incontinence based on evidence of urinary retention (residual urine volume >200 mL). This patient was a newly diagnosed diabetic on oral hypoglycemic agents, who had a total voided volume of 1085 mL and a postvoid residual of 360 mL. She experienced the first urge to void at 870 mL and had no uncontrollable urge to void even at 1000 mL.

Among the remaining 46 women, the definitive diagnosis made using urogynecological examination and office cystometry was urge incontinence in 23 (50.0%), stress incontinence in 18 (39.1%), and mixed incontinence in 5 (10.9%). The full comparison of the QUID and office cystometric diagnoses of the subjects is shown in Table 3. Similar to the pattern obtained with QUID, the distribution of urinary incontinence diagnoses made using urogynecological examination and office cystometry was urge incontinence, stress incontinence, and mixed incontinence in order of prevalence. Using urogynecological examination and office cystometry diagnosis as the gold standard in these 46 patients, the sensitivity, specificity, PPV and NPV of QUID were calculated for stress, urge, and mixed incontinence, respectively. As shown in Table 4, QUID scored highly in all these test performance indicators, except for its

Table 1: Baseline characteristics of women with QUID-diagnosed urinary incontinence

Variable	Mean±SD or frequency (*n*=60)	Range or %
Age (years)	49.5±16.0	23-89
Weight (kg)	70.9±17.2	30-115
BMI (kg/m^2)	28.7±5.9	16-46
Parity	4*	0-10
Level of education		
No formal education	11	18.3
Primary	13	21.7
Secondary	18	30.0
Tertiary	18	30.0
Menopausal status		
Premenopausal	30	50.0
Postmenopausal	30	50.0
Previous delivery		
Spontaneous vaginal delivery	55	91.7
Caesarean delivery	2	3.3
Instrumental delivery	-	-
None	3	5.0
Comorbid conditions		
None	41	68.3
Hypertension	17	28.3
Diabetes mellitus	1	1.7
Mental illness	1	1.7
QUID diagnosis		
Urge incontinence	30	50.0
Stress incontinence	18	30.0
Mixed incontinence	12	20.0

QUID, Questionnaire for Urinary Incontinence Diagnosis; SD, Standard deviation; BMI, Body mass index. *Median

Table 2: Findings on urogynecological examination and office cystometry

Variable	Mean±SD or frequency (*n*=60)	Range or %
Total voided volume	289.5±172.0	150-1081
Volume at first urge (mL)	226.8±128.6	50-870
Volume at uncontrollable urge (mL)	360.0±172.1	70-990
Residual urine volume (mL)		
<100	59	98.3
>100	1	1.7
Office cystometric diagnosis		
Urge incontinence	23	38.3
Stress incontinence	18	30.0
Mixed incontinence	5	8.3
Overflow incontinence	1	1.7
No demonstrable incontinence	13	21.7

SD, Standard deviation

Table 3: Comparison of the office cystometric and QUID diagnoses of women with urinary incontinence initially detected using QUID

		Office cystometry					
		SUI	UUI	MUI	OUI	Normal	Total
QUID	SUI	10	2	1	**1**	**4**	**18**
	UUI	1	20	1	**0**	**8**	**30**
	MUI	7	1	3	**0**	**1**	**12**
	Total	18	23	5	1	13	60

QUID, Questionnaire for Urinary Incontinence Diagnosis; SUI, Stress urinary incontinence; UI, Urge urinary incontinence; MUI, Mixed urinary incontinence; OUI, Overflow urinary incontinence

Table 4: Sensitivity, specificity, PPV, and NPV of QUID, using office cystometry as "gold standard"

	SUI	UUI	MUI
Sensitivity	55.6%	87.0%	60.0%
Specificity	89.3%	87.5%	80.5%
PPV	76.9%	90.9%	27.3%
NPV	75.8%	87.5%	94.3%

SUI, Stress urinary incontinence; UUI, Urge urinary incontinence; MUI, Mixed urinary incontinence; PPV, Positive predictive value; NPV, Negative predictive value

low sensitivity in stress incontinence (55.6%), and its low sensitivity (60%) and PPV (27.3%) in mixed incontinence.

Discussion

In Nigeria and indeed many other sub-Saharan African countries, urinary incontinence due to genitourinary fistula resulting from prolonged obstructed labor or harmful traditional practices is still so common that the term "urinary incontinence" is virtually synonymous with vesicovaginal fistula.[12] Compared with the large volume of research publications on genitourinary fistula from sub-Saharan Africa, studies on nonfistulous urinary incontinence in the region are very rare. This uncovers the need to build local experience in the evaluation and management of nonfistulous urinary incontinence in this setting, even in the face of nonavailability of urodynamics equipment due to resource constraints.

The use of clinical methods including historical screening, pad weighing test, cough stress test, deep pelvic examination, dipstick testing/urinary culture, and office cystometry has evolved over many years, and urodynamic testing now occupies the pinnacle for the diagnostic evaluation of urinary incontinence. Chronologically, various questionnaires have also been developed and rigorously tested for the enhancement of screening and categorization of urinary incontinence. For example, the QUID which was used for screening of the patients in this study had been shown in previous studies to perform remarkably well in classifying the type of urinary incontinence present in symptomatic women.[11,13,14]

In this study, QUID accurately identified the presence of urinary incontinence in 78.3% of the studied population with a crude false-positive rate of 21.7%. This rate of pick up is comparable to that demonstrated in the original validation studies comparing QUID against the incontinence specialists' clinical diagnosis as gold standard.[13] Also, the sensitivity and specificity obtained for QUID in the diagnosis of urge incontinence were comparable to those of the earlier validation studies.[11,13,14]

In particular, this study demonstrated a high level of agreement between QUID and office cystometry for the diagnosis of urge incontinence. This finding aligns with earlier works which reported QUID as one of the most accurate questionnaires in the diagnosis of urge incontinence and stress incontinence.[11,13,14] These data therefore further support the use of QUID as a screening and classification tool for urinary incontinence, even among Nigerian women.

Office cystometry was used as the gold standard in this study, and the high level of agreement demonstrated between the QUID and office cystometric evaluation implies that both can be effectively combined in the evaluation of women with urinary incontinence in this environment. The steps in office cystometry are simple, easy to learn skills which when combined with thorough systematic history taking become very useful in proper evaluation of women with urinary incontinence. In this regard, this study further validated the work of Smith and Neale, the pioneers of office cystometry.[8]

This study is not without limitations. These include the nonperformance of urinary dipstick/urine culture and the pad test. Urinary dipstick/urine culture is important in determining the possible role of urinary tract infection in cases of urinary incontinence. It was, however, not part of the protocol from the inception of this study. Also, although the pad weighing test could further enhance the detection of milder urinary incontinence which might not have been demonstrable during urogynecological examination, it was not performed in this study due to the lack of a high sensitivity weighing scale. For future investigations therefore, the intravesical instillation of dye (e.g., indigo carmine or methylene blue) which would enable the visual detection of urine leakage on the pad could be considered, especially in resource-constrained settings.

In conclusion, this study explored a largely overlooked age-long, simple, reliable, and technology-appropriate solution for the evaluation of patients with nonfistulous urinary incontinence in resource-constrained settings. A high level of agreement was demonstrated between the

urinary incontinence type as determined by QUID and the definitive diagnosis based on urogynecological examination and office cystometry in the individual patient. Based on the findings of this study, a combination of a screening tool such as QUID with urogynecological examination and office cystometry constitutes a veritable armamentarium for evaluation of nonfistulous urinary incontinence, among patients in resource-constrained settings where there is no access to urodynamics.

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Conflicts of interest

There are no conflicts of interest.

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