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Diagnostic agreement of the 3 Incontinence Questionnaire to video-urodynamics findings in women with urinary incontinence

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Introduction There are limited studies evaluating the 3 Incontinence Questionnaire (3IQ) against urodynamics based diagnosis as a reference standard. The 3IQ has been proposed to be useful to evaluate women at the level of primary care. The aim of this study was to determine correlation between 3IQ and video-urodynamics (VUDS) in diagnosing types of urinary incontinence.

Material and methods Prospective data was collected on 200 consecutive female patients referred by primary care physicians for urinary incontinence. The mean age was 55 years (range 15–83 years). The patients were evaluated using the 3IQ and video-urodynamics. The 3IQ-based diagnosis of type of female urinary incontinence was compared to VUDS-based results. Sensitivity, specificity, positive likelihood ratios and positive predictive values were calculated.

Results On 3IQ based self-evaluation, 28% of patients were classified as having stress urinary incontinence, 20% with urge incontinence and 40% with mixed incontinence. On video-urodynamics, urodynamic stress urinary incontinence (UDSUI) was detected in 56% of patients, detrusor overactivity (DO) in 15% and mixed urinary incontinence (MUI) in 19%. The 3IQ had a sensitivity and specificity respectively of 43% and 92% for UDSUI, 57% and 86% for DO and 58% and 64% for MUI. The corresponding positive likelihood ratios (CI, 95%) were 5.4 (CI 2.6 to 11.3) for stress urinary incontinence, 4.0 (CI 2.5 to 6.5) for DO and 1.62 (1.2 to 2.3) for MUI. The respective positive predictive values were 87% (CI 75% to 95%), 42% (CI 26% to 58%) and 28% (18% to 39%).

Conclusions In our study population, stress urinary incontinence was reasonably well predicted by the 3IQ, but the questionnaire under-performed in the diagnoses of detrusor overactivity and mixed urinary incontinence.

Key Words: urinary incontinence ‹› urodynamics ‹› incontinence questionnaire

INTRODUCTION

The International Continence Society (ICS) defines urinary incontinence as the complaint of any involuntary leakage of urine [1, 2]. The most commonly encountered types of female incontinence are stress incontinence, urge incontinence and mixed incontinence. Urinary incontinence symptoms seriously influence the physical, psychological, and social well-being of the affected individuals. The prevalence estimates for urinary incontinence in women range from 5% to 69% [3, 4, 5].

The type of female urinary incontinence is diagnosed through thorough history taking, physical examination including the cough test, and may progress to a formal urodynamic evaluation. The history can be an unreliable predictor of underlying causes of urinary incontinence [7]. Bates et al. showed that clinical evaluation combined with physical examination have limitations in diagnosing the type

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of incontinence [8]. The ICS committee recommends urodynamic testing in patients with incontinence when an objective diagnosis is warranted [6].
Several well-constructed questionnaires specific to female urinary incontinence are available as screening tools, symptom indices and quality of life measures [9, 10, 11]. Multiple studies have examined the association between self-reported incontinence and clinically demonstrable incontinence, and by type of incontinence based on self-reported compared to type based on clinical diagnosis [5, 9, 12]. The '3 Incontinence Questionnaire' (3IQ) is a brief, self-administered questionnaire to distinguish stress, urge and mixed incontinence (Figure 1). It includes 3 questions and requires about 30 seconds to complete. The 3IQ responses from participants were compared to the extended evaluation made by a urologist or gynaecologist [12]. The questionnaire was primarily developed to help family physicians in primary care initiate non-invasive treatment and thus reduce the amount of referrals to specialists.
This study is the first in the literature to correlate the 3IQ based diagnosis with video-urodynamic (VUDS) evaluation in female patients referred by their primary care physician with urinary incontinence.

MATERIAL AND METHODS

In this prospective study carried out in 2010 at a district general hospital registered with the Trust Research and Audit Department (Number P1080), we assessed two hundred female patients referred by primary care practitioners to the female urology clinic with urinary incontinence. Inclusion criteria included ambulatory female patients referred with new onset of urinary incontinence. Patients with recurrent urinary tract infections, recently failed incontinence surgery, suspected urinary fistulas, spinal cord injury, genitourinary malformations, pelvic malignancy and previous abdominopelvic radiotherapy were excluded. All the recruited patients underwent urine dipstick testing to rule out active urinary tract infection and were then clinically evaluated by a urologist. Clinical evaluation included thorough history taking, clinical examination including cough test for demonstration of stress incontinence and urine dipstick testing for infection. All patients completed the 3IQ questionnaire, three days of frequency volume charts and had VUDS. Demographic and baseline data of the patients were collected and can be seen in Table 2. All patients underwent standardized VUDS evaluation by an experienced urology specialist nurse. The studies were performed and interpreted in line with the report from the standardisation sub-committee of the International Continence Society [1]. Patients were classified according to video-urodynamic findings into urodynamic stress incontinence (UDSUI), detrusor overactivity (DO), mixed incontinence (combined UDSUI and DO) and normal (Table 2). The accuracy estimates for classification of stress, urge and mixed urinary incontinence based on 3IQ results compared with VUDS as a reference standard were calculated. Data were summarised as mean or median and range was used where appropriate with 95% confidence intervals (CI). Statystical analaysis including sensitivity, specificities, positive and negative likelihood ratios was performed using MedCalcTM version 11.1.10 software (Ostend, Belgium).

RESULTS

The characteristics of patients and video-urodynamic findings collected are presented in Table 1 and 2 respectively. The mean age of the patients with urodynamic stress urinary incontinence (UDSUI),

3IQ

Q1. During the last three months have you leaked urine (even a small amount)?
Yes (Ref. to question 2)
No (End of questions)

Q2. During the last three months did you leak urine?
(Check all that apply)
a. When you were performing some physical activity, such as coughing, sneezing, lifting, or exercise?
b. When you had the urge or the feeling that you needed to empty your bladder, but you couldn't get to the toilet fast enough?
c. Without physical activity and without a sense of urgency?

Q3. During the last three months did you leak urine most often:
(Check only one)
a. When you were performing some physical activity, such as coughing, sneezing, lifting, or exercise?
b. When you had the urge or the feeling that you needed to empty your bladder, but you couldn't get to the toilet fast enough?
c. Without physical activity and without a sense of urgency?

Key
Most often with physical activity: stress-only or stress-predominant urinary incontinence.
Most often with the urge to empty the bladder: urge-only or urge-predominant urinary incontinence.
Without physical activity or sense of urgency: incontinence due to other causes.
About equally with physical activity and sense of urgency: a mix of incontinence type.

Figure 1. *The 3 Incontinence Questionnaire (3IQ).*

detrusor overactivity (DO) and mixed urinary incontinence (MUI) were 55, 56 and 57 years respectively (SD, 13.7, 16.9 and 13.8 respectively). The mean duration of UDSUI, DO and MUI was 70, 99 and 76 months respectively.

Table 3 presents the prevalence of stress (stress-only plus stress-predominant), urge (urge-only plus urge-predominant), other causes of incontinence, and mixed incontinence on the basis of the results of the 3IQ, question 3 and the urodynamics

Table 1. *Characteristics of 200 participants undergoing urodynamic evaluation for urinary incontinence*

Variables	UDSUI[¥]	DO[€]	MUI[£]	Normal
Patients (n)	112	30	38	20
Mean (SD) age	55.15 (13.71)	56.10 (16.88)	56.68 (13.75)	53.5 (18.12)
Mean (SD) duration of incontinence (months)	69.6 (54.36)	98.9 (79.02)	76.2 (57.58)	118.7 (104.28)
Comorbidities				
Multiple sclerosis, n	0	2	1	0
Diabetes mellitus, n	5	0	2	2
Parkinson's disease, n	0	0	0	0
Dementia, n	0	1	0	0
Obstetric History				
Gravidity, n (%)				
None	5 (4.4)	3 (10)	3 (7.8)	1 (5)
1–2	60 (53.5)	12 (40)	22 (57.8)	10 (50)
3–4	39 (34.8)	12 (40)	10 (26.3)	7 (35)
>4	8 (7.1)	3 (10)	3 (7.8)	2 (10)
Parity, n (%)				
None	7 (5.5)	3 (10)	3 (7.8)	1 (5)
1–2	65 (58)	15 (50%)	22 (57.8)	12 (60)
3–4	35 (31.2)	10 (33.3)	10 (26.3)	7 (35)
>4	5 (4.4)	2 (6.6)	3 (7.8)	0
Spontaneous vaginal delivery, n (%)	99 (88)	23 (77)	33 (87)	17 (85)
Forceps/Ventouse, n (%)	10 (9)	0	0	0
C-section, n (%)	6 (5)	4 (13)	4 (10)	2 (10)
Social History				
Currently smoking (%)	36 (32)	7 (23)	12 (31)	3 (15)
Prior surgery				
Total abdominal hysterectomy, n (%)	28 (25)	7 (23)	14 (37)	3 (15)
Vaginal hysterectomy, n (%)	0	1 (3)	1 (2.6)	1 (5)
Anterior colporrhaphy, n (%)	5 (4.4)	3 (10)	3 (8)	0
Posterior colporrhaphy, n (%)	2 (2)	1 (3)	1 (2.6)	0
Oophorectomy, n (%)	8 (7)	0	1 (2.6)	1 (5)
Laparoscopic sterilisation, n (%)	4 (3.5)	0	2 (5)	0
Manchester repair, n (%)	0	1 (3)	0	0
Urethral dilatation, n (%)	4 (3.5)	1 (3)	3 (8)	2 (10)
Medication used in past for incontinence				
Anticholinergics, n (%)	4 (3.5)	3 (10)	7 (18)	2 (10)
Duloxetine, n (%)	3 (2.6)	0	0	0
Vaginal oestrogen, n (%)	5 (4)	1 (3)	2 (5)	0

[¥]UDSUI – urodynamic stress urinary incontinence; [€]DO – etrusor overactivity; [£]MUI – mixed urinary incontinence

Table 2. *Urodynamic findings in 200 patients evaluated for urinary incontinence*

Urodynamic findings	UDSUI[¥]	DO[€]	MUI[£]	Normal
Mean Qmax (95% CI)	30.2 (27.78 to 32.77)	27.7 (22.48 to 33.05)	25.2 (20.89 to 29.66)	21.6 (16.77 to 26.46)
Mean Qavg (95% CI)	13.7 (12.41 to 15.09)	12.0 (10.01 to 14.01)	12.1 (9.87 to 14.40)	8.9 (6.74 to 11.12)
Mean Pdet Qmax (95% CI)	28.5 (24.78 to 32.40)	34.1 (28.08 to 40.11)	22.9 (18.29 to 27.69)	29.7 (21.38 to 38.11)
Mean residual (95% CI)	11.1 (3.08 to 19.30)	8.0 (-0.38 to 16.51)	3.0 (-2.34 to 8.39)	8.5 (-4.31 to 21.31)
Mean capacity (95% CI)	601.6 (573.85 to 629.41)	450.8 (380.01 to 521.71)	512.9 (451.92 to 573.92)	583.8 (514.37 to 653.22)

[¥]UDSUI – urodynamic stress urinary incontinence; [€]DO – etrusor overactivity; [£]MUI – mixed urinary incontinence

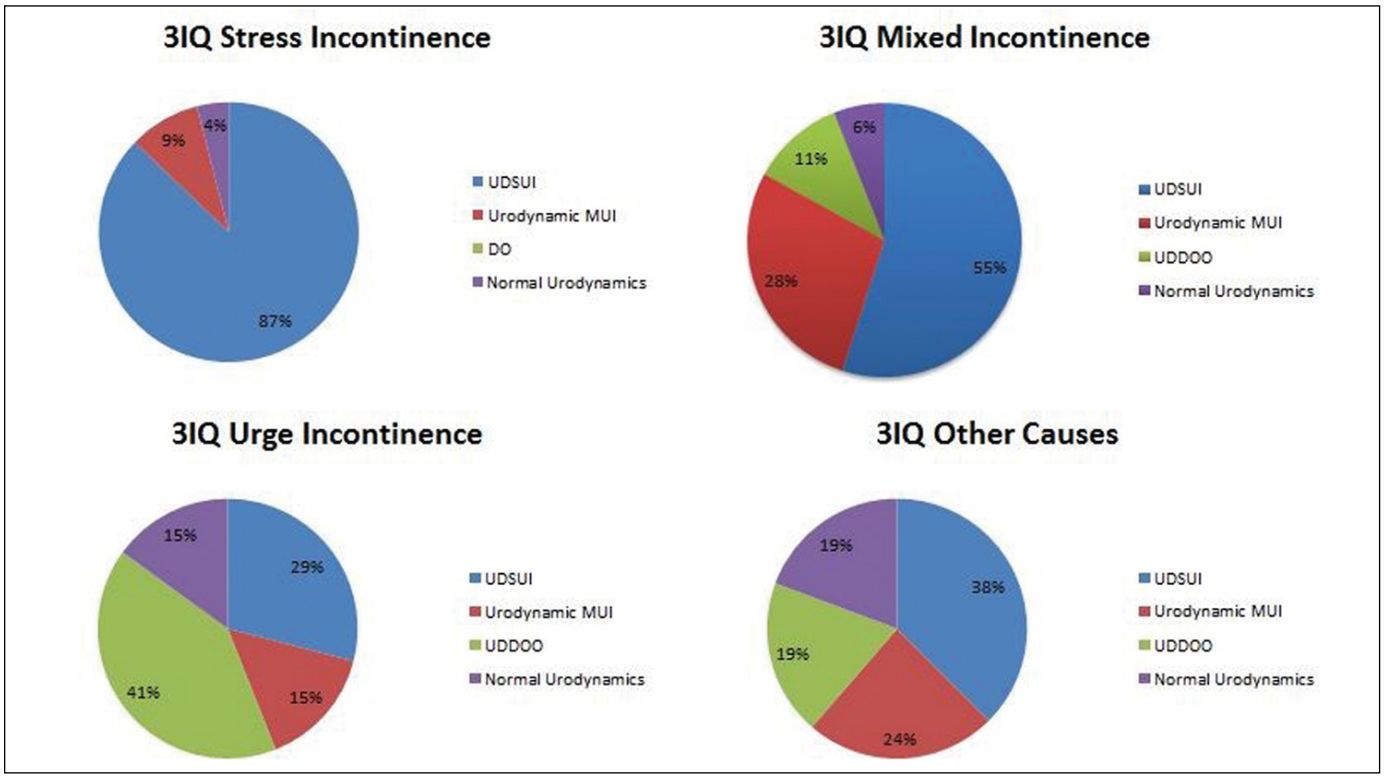

Figure 2. *The prevalence of Urodynamic stress, urge and mixed incontinence and normal urodynamics.*
UDSUI – urodynamic stress urinary incontinence; MUI – mixed urinary incontinence; UDMUI – Urodynamic MUI; DO – detrusor overactivity; UDDOO – urodynamic stress urinary incontinence

evaluation. The prevalence of UDSUI, DO, MUI and 'normal urodynamics' in patients with stress, urge, mixed incontinence and other causes of incontinence on 3IQ evaluation are presented in Figure 2. Interestingly, in the 'other causes' of incontinence documented in 12% (n = 24) of the cases in 3IQ questionnaire evaluation, 71% (n = 17) of these patients were classified into either of three categories (UDSUI/ DO/ MUI) by urodynamic study and for the remaining 29% (n = 7) of patients, the urodynamic evaluation was normal.

Table 4 presents the accuracy estimated for classification of stress, urge and mixed urinary incontinence based on 3IQ results compared with VUDS. For the cohort with UDSUI, the 3IQ question 3 section 'a' for SUI had a sensitivity of 43% (CI, 33.6% to 52.6%), a specificity of 92% (CI, 84.3% to 96.7%) and a positive likelihood ratio of 5.4 (CI, 2.6 to 11.3). For detrusor overactivity incontinence, the 3IQ question 3 section 'b' had a sensitivity of 57% (CI, 37.4% to 74.5%), a specificity of 86% (CI, 79.7% to 90.7%) and a positive likelihood ratio of 4.01 (CI, 2.5 to 6.5). For mixed urinary incontinence, the 3IQ question 3 section 'd' had a sensitivity of 58% (CI, 40.8% to 73.7%), a specificity of 64% (CI, 56.3% to 71.6%) and a positive likelihood ratio of 1.62 (CI, 1.15 to 2.27).

The age adjusted pre-test prevalence based on urodynamics and post-test probabilities for stress, urge incontinence and mixed urinary incontinence based on the 3IQ were also calculated (Table 5). For younger women with incontinence, the probability

Table 3. *Classification of type of urinary incontinence by video-urodynamic evaluation and 3IQ**

3IQ classification	Video-urodynamic diagnosis				
	UDSUI*, (n) (%)	DO#, (n) (%)	MUI‡, (n) (%)	Normal, (n) (%)	Total, (n) %
Stress UI (Yes to Q3a)	48 (88%)	0 (0%)	5 (9%)	2 (4%)	55 (100%)
Urge UI (Yes to Q3b)	12 (29%)	17 (41%)	6 (15%)	6 (15%)	41 (100%)
Other Causes (Yes to Q3c)	8 (33%)	4 (17%)	5 (21%)	7 (17%)	24 (100%
Mixed UI (Yes to Q3d)	44 (55%)	9 (11%)	22 (28%)	5 (6%)	80 (100%)
Total	112	30	38	20	200

*Percentages may not add up to 100 because of rounding; UI – urinary incontinence; †UDSUI – urodynamic stress urinary incontinence; #DO – detrusor overactivity; ‡MUI – mixed urinary incontinence

Table 4. *Accuracy of the 3IQ compared with the urodynamic evaluation**

Variable	Stress incontinence (Y to Q3a) (95% CI)	Urge incontinence (Y to Q3b) (95% CI)	Mixed incontinence (Y to Q3c) (95% CI)
Sensitivity (95% CI)	43% (33.6% to 52.55%)	57% (37.4% to 74.5%)	58% (40.8% to 73.7%)
Specificity (95% CI)	92% (84.3% to 96.7%)	86% (79.7% to 90.7%)	64% (56.3% to 71.6%)
Positive likelihood ratio (95% CI)	5.39 (2.6 to 11.3)	4.01 (2.5 to 6.5)	1.62 (1.2 to 2.3)
Negative likelihood ratio (95% CI)	0.62 (0.5 to 0.7)	0.50 (0.3 to 0.8)	0.66 (0.4 to 1.0)
Positive predictive value (95% CI)	87% (75.5% to 94.7%)	42% (26.3% to 57.(%)	28% (18.1% to 38.6%)
Negative predictive value (95% CI)	55.86% (47.4% to 64.1%)	82.28% (72.1% to 90%)	86.67% (79 to 92%)

*3IQ – 3 Incontinence Questionnaire; CI – confidence interval

for stress incontinence increased from 50% to 84% when answering yes to question 3a, while for urge incontinence (yes to Q3b) the probability increased from 15% to 42%. Among middle-aged women, the probability for stress incontinence increased from 63% to 90% while for urge incontinence the probability increased slightly from 12% to 36% in women selecting Q3a or Q3b). In older population, the probability for stress urinary incontinence increased from 49% to 84% (yes to Q3a) and for urge incontinence (yes to Q3b) the probability increased from 18% to 47%. For mixed urinary incontinence, there was no change in post-test probability in young women (i.e. 15%) and a slight increase in probability for the middle aged and older female population respectively (25% to 23% and 23% and 35%).

DISCUSSION

In this study, we have compared the 3IQ to the diagnosis determined by multi-channel VUDS, which to our knowledge has not been reported in the literature. In our study, the 3IQ was reliable at predicting the presence of stress incontinence, but did less well for DO and MUI. As such, clinicians in primary care can use the 3IQ to diagnose patients with urinary incontinence, although they may find it less useful for identifying women with DO or MUI.

The self-reported 3IQ classifies incontinence into stress urinary incontinence, urge urinary incontinence, incontinence due to other causes and mixed incontinence (combined stress and urge incontinence) (Figure 1). In the present study, symptoms of leakage of urine during physical activity (3IQ question 3, part a) identified less than half the women with UDSUI (sensitivity 43%), but a positive answer increased the probability significantly of UDSUI being present (predictive value 87%, positive likelihood ratio 5.4) This is in keeping with the findings of Bergman et al. wherein the correlation of detailed urinary symptoms 64-item questionnaire and urodynamics findings for SUI was

Table 5. *Post-test probability of urge and stress incontinence in women after 3IQ evaluation*

Age	Prevalence of incontinence (video-urodynamics based pretest probability), %			Post-Test Probability (3IQ Response), %		
	UDSUI[£]	DO[€]	MUI[£]	Positive for stress incontinence (Q3a) (95% CI)	Positive for urge incontinence (Q3b) (95% CI)	Positive for MUI (Q3d) (95% CI)
<40 y	50	15.3	15.3	84.4 (71.9–91.9)	42.2 (30.9–54.1)	22.7 (17.2–29.1)
40-60 y	62.8	12.3	15.4	90.1 (81.2–95.0)	36.1 (25.7–47.8)	22.9 (17.3–29.2)
>60 y	49.3	18.1	24.6	84.0 (71.3–91.7)	47.1 (35.3–59.0)	34.7 (29.2–44.9)

UDSUI[£] – urodynamic stress incontinence; DO[€] – detrusor overactivity; MUI[£] – mixed urinary incontinence

80% [13]. The clinical ramification is that about 40 to 55% of women who answer yes to section 'b' of question 3 have UDSUI and should be evaluated for SUI. If they do not respond to measures such as anti-muscarinic drugs, treatment for stress urinary incontinence should be considered.

There is controversy in the literature regarding the usefulness of incontinence tools such as questionnaires. Several studies have shown strong association between the symptoms of SUI and UDSUI, however 50% to 73% of the patients who had DO also complained of SUI symptoms [14, 15, 16]. Harvey and Versi reviewed the published literature for correlation of symptoms and signs of stress incontinence in predicting the presence of UDSUI. The isolated symptom of stress incontinence had a positive predictive value (PPV) of 56% for the diagnosis of UDSUI. They concluded that in isolation, either symptom or sign were poor predictors of UDSUI, although when used in combination, may make prediction more promising [17]. Jarvis et al. also highlighted the poor correlation between lower urinary tract symptoms and urodynamic findings, showing an agreement of only 68% for stress urinary incontinence and 51% for detrusor overactivity [18]. Also, it was noted that if the principal complaint is SUI and the physical signs of stress incontinence are elicited then the likelihood of detecting the UDSUI is >90% [19, 20]. In our study, only 43% of UDSUI patients answered 'yes' to the SUI question on 3IQ evaluation, thus symptoms based diagnosis other than SUI was noted in the rest 57% of this group of patients. However, a positive 3IQ response for SUI significantly increased the probability of SUI to 87%.

The ICS subcommittee proposed two terms to be used in urinary urgency: overactive bladder syndrome (OAB), as a symptom syndrome without a definitive diagnosis, and detrusor overactivity (DO) to describe the typical urodynamic findings of involuntary detrusor contraction [21]. Detrusor overactivity incontinence (DOI) represents the leakage of urine as a result of involuntary detrusor activity during the storage phase of the urodynamics testing [1]. The 3IQ questionnaire (Question 3, section 'b') diagnoses urge urinary incontinence, a component of OAB, while urodynamics diagnoses DO and DOI. In this study, the OAB question in the third part of the questionnaire has a sensitivity of 57% for DO (Table 4) thus about half the patients with DO/DOI will be missed on 3IQ and the specificity of 86% suggests that about 14% of patients with other types of incontinence will be diagnosed with UUI. The PPV of 41% is in keeping with the observation of Young et al. who also showed that the history of pure urge incontinence may be have a PPV of only 37% [22]. There is also poor correlation between symptoms of overactive bladder syndrome and the diagnosis of DO with a PPV of only 54% [23].

Mixed urinary incontinence is a term that is applied both to a combination of incontinence symptoms (SUI symptoms and OAB) and to a combination of urodynamic conditions (UDSUI and DO/ DOI) in the same individual [20]. Question 3, section 'd' of the 3IQ is for the diagnosis of combination of SUI and OAB. In our study, though a majority of women had symptoms of mixed incontinence (40%) on 3IQ self-reported evaluation, on urodynamic evaluation only 19% patients were diagnosed with MUI. This is in keeping with the findings of Bump et al. who reported that the majority of women with mixed symptoms do not have VUDS evidence of MUI [24]. As many as 55% of women with UDSUI and 38% with DO have mixed symptoms [14]. The 3IQ questionnaire has a low sensitivity and specificity of 58% and 64% respectively for MUI, thus not only would a significant number of patients with mixed urinary incontinence be missed but also a significant number of patients with other types of incontinence would be incorrectly diagnosed with mixed urinary incontinence.

The intrinsic variability of physical factors being tested can undermine overall value of urodynamic testing, thus probably explaining the inability of urodynamics to demonstrate incontinence in 10% of our patients. About 3 to 25% cases remain undiagnosed at the end of urodynamic study [25]. Interestingly, in our study 12% (n = 24) of patients classified their incontinence to be due to 'other causes' (3IQ question 3 section c) but on VUDS, 71% (n = 17) of these patients were classified into the above stated three types of urinary incontinence (UDSUI – 33%, DO – 16% and MUI – 20%), thus leaving 29% (n = 7) patients undiagnosed. These figures do highlight the limitations of urodynamics in that not all patients who have a strong history of SUI can be reproduced on VUDS [26]. However, urodynamics combined with clinical information have high diagnostic agreement between investigators thus supporting its value as a reproducible diagnostic tool [27, 28]. The difference in what is demonstrated urodynamically from what is perceived by the patient is perhaps not surprising; urodynamics and validated questionnaires probably measure related but different aspects of urinary incontinence [27, 28].

CONCLUSIONS

Our study demonstrated that the evaluation of symptoms of stress urinary incontinence based on the 3IQ questionnaire was a good diagnostic tool in predicting UDSUI. Question 3 section 'b' of the 3IQ covers features of OAB and this performs inadequately in predicting DO on urodynamic evaluation. The 3IQ questionnaire showed low performance in diagnosing urodynamically demonstrated MUI. Therefore, we would suggest that a complete history, thorough clinical evaluation and in selected cases urodynamic testing are still essential in the accurate diagnosis and appropriate management of female urinary incontinence.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

References

1. 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. Urology. 2003; 61: 37-49.
2. 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. Int Urogynecol J. 2010; 21: 5-26.
3. Swithinbank LV, Donovan JL, du Heaume JC, Rogers CA, James MC, Yang Q, Abrams P. Urinary symptoms and incontinence in women: relationships between occurrence, age, and perceived impact. Br J Gen Pract. 1999; 49: 897-900.
4. Holroyd-Leduc JM, Tannenbaum C, Thorpe KE, Straus SE. What type of urinary incontinence does this woman have? JAMA. 2008; 299: 1446-1456.
5. Sandvik H, Hunskaar S, Vanvik A, Bratt H, Seim A, Hermstad R. Diagnostic classification of female urinary incontinence: an epidemiological survey corrected for validity. J Clin Epidemiol. 1995; 48: 339-343.
6. Abrams P, Andersson KE, Birder L, et al. Fourth International Consultation on Incontinence Recommendations of the International Scientific Committee: Evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. Neurourol Urodyn. 2010; 29: 213-240.
7. Summitt RL, Jr., Stovall TG, Bent AE, Ostergard DR. Urinary incontinence: correlation of history and brief office evaluation with multichannel urodynamic testing. Am J Obstet Gynecol. 1992; 166: 1835-1840.
8. Bates CP, Whiteside CG, Turner-Warwick R. Synchronous cine-pressure-flow-cystourethrography with special reference to stress and urge incontinence. Br J Urol. 1970; 42: 714-723.
9. Bradley CS, Rovner ES, Morgan MA, Berlin M, Novi JM, Shea JA, Arya LA. A new questionnaire for urinary incontinence diagnosis in women: development and testing. Am J Obstet Gynecol. 2005; 192: 66-73.
10. Lose G, Fantl JA, Victor A, Walter S, Wells TL, Wyman J, Mattiasson A. Outcome measures for research in adult women with symptoms of lower urinary tract dysfunction. Neurourol Urodyn. 1998; 17: 255-262.
11. Assessment and treatment of urinary incontinence. Scientific Committee of the First International Consultation on Incontinence. Lancet. 2000; 355: 2153-2158.
12. Brown JS, Bradley CS, Subak LL, Richter HE, Kraus SR, Brubaker L, Lin F, Vittinghoff E, Grady D. The sensitivity and specificity of a simple test to distinguish between urge and stress urinary incontinence. Ann Intern Med. 2006; 144: 715-723.
13. Bergman A, Bader K. Reliability of the patient's history in the diagnosis of urinary incontinence. Int J Gynaecol Obstet. 1990; 32: 255-259.
14. Cardozo LD, Stanton SL. Genuine stress incontinence and detrusor instability--a review of 200 patients. Br J Obstet Gynaecol. 1980; 87: 184-190.
15. Staskin DR, Zimmern PE, Hadley HR, Raz S. Pathophysiology of stress incontinence. Clin Obstet Gynaecol. 1985; 12: 357-368.
16. Walters MD, Shields LE. The diagnostic value of history, physical examination, and the Q-tip cotton swab test in women with urinary incontinence. Am J Obstet Gynecol. 1988; 159: 145-149.
17. Harvey MA, Versi E. Predictive value of clinical evaluation of stress urinary

incontinence: a summary of the published literature. Int Urogynecol J Pelvic Floor Dysfunct. 2001; 12: 31-37.

18. Jarvis GJ, Hall S, Stamp S, Millar DR, Johnson A. An assessment of urodynamic examination in incontinent women. Br J Obstet Gynaecol. 1980; 87: 893-896.

19. Farrar DJ, Whiteside CG, Osborne JL, Turner-Warwick RT. A urosynamic analysis of micturition symptoms in the female. Surg Gynecol Obstet. 1975; 141: 875-881.

20. Versi E, Cardozo L, Anand D, Cooper D. Symptoms analysis for the diagnosis of genuine stress incontinence. Br J Obstet Gynaecol. 1991; 98: 815-819.

21. Abrams P. Describing bladder storage function: overactive bladder syndrome and detrusor overactivity. Urology. 2003; 62: 28-37.

22. Young SB, Pingeton DM. Office assessment of female urinary incontinence. Clin Obstet Gynecol. 1999; 42: 249-266.

23. Digesu GA, Khullar V, Cardozo L, Salvatore S. Overactive bladder symptoms: do we need urodynamics? Neurourol Urodyn. 2003; 22: 105-108.

24. Bump RC, Norton PA, Zinner NR, Yalcin I. Mixed urinary incontinence symptoms: urodynamic findings, incontinence severity, and treatment response. Obstet Gynecol. 2003; 102: 76-83.

25. Jensen JK, Nielsen FR, Jr., Ostergard DR. The role of patient history in the diagnosis of urinary incontinence. Obstet Gynecol. 1994; 83: 904-910.

26. Homma Y. The clinical significance of the urodynamic investigation in incontinence. BJU Int. 2002; 90: 489-497.

27. Whiteside JL, Hijaz A, Imrey PB, Barber MD, Paraiso MF, Rackley RR, Vasavada SP, Walters MD, Daneshgari F. Reliability and agreement of urodynamics interpretations in a female pelvic medicine center. Obstet Gynecol. 2006; 108: 315-323.

28. Digesu GA, Hutchings A, Salvatore S, Selvaggi L, Khullar V. Reproducibility and reliability of pressure flow parameters in women. BJOG. 2003; 110: 774-776. ■