

#736 Characterizing detrusor overactivity in older women with stress urinary incontinence: Are urodynamics always necessary?

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Hypothesis / aims of study

Detrusor overactivity (DO) is the occurrence of spontaneous or provoked detrusor contractions during the filling phase of a urodynamic study (UDS) [1]. DO may or may not be accompanied by symptoms, including urinary urgency and/or urgency urinary incontinence (UUI), but has been associated with greater symptom severity in patients with overactive bladder syndrome [1,2]. In women with stress urinary incontinence (SUI), DO has been relatively less well characterized, but it carries the potential to directly affect management—even in a sizable proportion of patients with suspected “pure SUI” [3]. In view of recent global trends away from routine use of UDS for SUI, we aimed to characterize the cystometric outcomes of older women with SUI based on the presence or absence of DO, and to determine whether non-invasive clinical data may be used to predict the presence of DO in this population.

Study design, materials and methods

Secondary analysis of prospective observational study of urinary incontinence in older adult women and men (NCT04094753). Enrolled were adults ≥65 years of age with preserved cognitive function consulting a tertiary referral hospital for urinary incontinence from 2013 to 2020. Most participants had longstanding symptoms and some had undergone prior lifestyle, medical, and/or surgical interventions for incontinence or pelvic organ prolapse prior to study enrollment. Participants underwent a comprehensive baseline assessment including genitourinary and general examination, which included a supine and standing stress cough test, detailed medical and social history, and completed several validated supportive questionnaires. Subjects then completed a baseline bladder diary (24-72h), followed by a UDS, as well as laboratory testing with comprehensive urine sampling. Bladder diary analysis was performed in accordance with current International Continence Society terminology [2]. DO was defined as a rise in detrusor pressure ≥15 cm H₂O with or without leakage. For the present study, only the first 24 hours of the bladder diary were assessed from patients who maintained their diary for a longer duration.

Included in the present study were women with SUI and without associated urinary retention. Included subjects were grouped based on the presence or absence of DO observed during UDS. Study groups were compared using a Wilcoxon rank-sum test for continuous variables and chi-squared test for categorical variables. Tests were performed two-sided and a p-value <0.05 was deemed statistically significant. Bladder diary parameters which significantly differed between groups were subsequently included in multivariable logistic regression analysis with DO as the independent variable. Independent bladder diary predictors of DO, as ascertained from logistic regression, were subsequently included in receiver operating characteristic (ROC) analysis with a Youden's index to determine cutoff values for DO (cases) vs. no DO (reference group). Small numbers of missing data were excluded.

A separate subgroup analysis was performed to better characterize the relationship between clinical symptoms and UDS findings in this population. Subjects were stratified based on the presence or absence of self-reported frequent UUI episodes, as ascertained from question 9A of the International Consultation on Incontinence Questionnaire on Female Lower Urinary Tract Symptoms (ICIQ-FLUTS). Subjects who responded “most” or “all of the time” to the question, “does urine leak before you can get to the toilet?” were considered to have frequent UUI, while those who responded “sometimes,” “occasionally,” or “never” were classified as having infrequent UUI episodes.

Results & interpretation

A total of 85 women (median age 74 [interquartile range 71-80] years) met the criteria for inclusion, of whom 41 (48%) were found to have DO on UDS (Table 1).

	All Subjects (n=85)		
	DO+	DO-	p-value
Cystometry			
First Sensation (mL)	190 (120-250)	220 (160-300)	0.15
First Urge (mL)	240 (180-310)	290 (220-380)	0.073
Full Bladder (mL)	320 (230-380)	350 (300-450)	0.045*
Compliance (mL/cm H ₂ O)	30 (18-63)	46 (30-77)	0.13
Voiding diary data			
Voids/24h	9 (8-11)	9 (7-10)	0.28
Daytime voids	7 (6-9)	7 (6-8)	0.26
Nighttime voids	2 (1-3)	2 (1-3)	0.58
Volume/24h	2000 (1700-2500)	2400 (1700-2900)	0.26
MVV/24h	380 (280-450)	440 (340-530)	0.0049*
Median VV/24h	180 (150-270)	230 (150-320)	0.11
UI episodes/24h	3 (1-6)	1 (0-5)	0.039*

Note: Continuous variables reported as *median (interquartile range)*. (*) Denotes statistical significance. Abbreviations – DO, detrusor overactivity; MVV – maximum voided volume (single largest voided volume across voiding diary study period) UI, urinary incontinence; UUI, urgency urinary incontinence; VV – voided volume.

Results & interpretation (cont.)

	Frequent UUI (n=33)			Infrequent UUI (n=52)		
	DO+	DO-	p-value	DO+	DO-	p-value
Cystometry						
First Sensation (mL)	180 (86-210)	270 (230-310)	0.029*	230 (160-270)	210 (160-290)	0.86
First Urge (mL)	210 (140-240)	310 (260-420)	0.0087*	270 (220-340)	260 (220-350)	0.98
Full Bladder (mL)	300 (220-330)	410 (330-480)	0.023*	360 (290-390)	350 (310-440)	0.56
Compliance (mL/cm H ₂ O)	46 (34-110)	200 (120-300)	0.10	31 (18-61)	45 (28-64)	0.36
Voiding diary data						
Voids/24h	9 (8-12)	9 (7-10)	0.63	10 (9-11)	9 (8-10)	0.21
Daytime voids	8 (6-10)	7 (7-9)	0.49	7 (7-8)	7 (6-8)	0.41
Nighttime voids	2 (1-2)	1 (1-3)	0.72	2 (2-3)	2 (2-2)	0.34
Volume/24h	1900 (1700-2500)	2300 (1700-2700)	0.41	2100 (1700-2800)	2500 (1700-3000)	0.59
MVV/24h	350 (250-400)	500 (380-520)	0.017*	380 (300-450)	420 (340-530)	0.15
Median VV/24h	170 (120-250)	200 (130-300)	0.40	210 (160-300)	230 (180-350)	0.33
UI episodes/24h	5 (2-6)	4 (1-7)	0.62	2 (0-5)	1 (0-4)	0.44

Note: Continuous variables reported as *median (interquartile range)*. (*) Denotes statistical significance. Abbreviations – DO, detrusor overactivity; MVV – maximum voided volume (single largest voided volume across voiding diary study period) UI, urinary incontinence; UUI, urgency urinary incontinence; VV – voided volume.

Subjects with vs. without DO were significantly more likely to self-report frequent UUI episodes (51% vs. 27%, p=0.024). The median volume at which patients endorsed sensation of bladder fullness on UDS was 320 (230-380) ml with DO compared to 350 (300-250) ml without DO (p=0.045). Correspondingly, on 24-hour bladder diary analysis, participants with vs. without DO were found to have smaller maximum voided volumes (380 [280-450] vs. 440 [340-530] ml, p=0.0049) and a greater number of incontinence episodes per 24-hour period (3 [1-6] vs 1 [0-5], p=0.039). Multivariable logistic regression identified 24-hour maximum voided volume as a significant predictor of DO (p=0.0086), independent of 24-hour incontinence episodes (p=0.2190). ROC analysis using 24-hour maximum voided volumes to predict DO demonstrated an area under the curve (AUC) of 0.667 (p=0.002) with an optimal cutpoint of ≤460 ml, corresponding to a sensitivity, specificity, positive predictive value, and negative predictive value of 0.88, 0.45, 0.6, and 0.8, respectively.

In the subset of patients with self-reported frequent UUI episodes, those with vs. without DO experienced significantly lower volumes associated with first sensation (p=0.029), first urge (p=0.009), and sensation of bladder fullness (0.023). Median 24-hour maximum voided volume was also significantly smaller in those subjects with vs. without DO in this subgroup (350 [250-400] ml vs. 500 [380-520] ml, p=0.017). For this subgroup, the largest AUC (0.761, p=0.007) was also observed to have an optimal cutpoint of ≤460 ml for 24-hour maximum voided volume. Using a threshold of ≤460 ml for DO corresponded to a sensitivity, specificity, positive predictive value, and negative predictive value of 0.95, 0.55, 0.8, and 0.86, respectively. In the subset of patients without self-reported frequent UUI episodes, no significant differences were observed between the cystometric nor bladder diary parameters assessed.

DO is a common finding in older women with SUI and associated with increased probability of self-reported frequent UUI episodes. DO is associated with a trend toward smaller volumes at which patients experience first sensation, first urge, and bladder fullness on UDS—a finding which is most pronounced in those patients who self-report frequent UUI episodes. Correspondingly, women with DO experience smaller maximum voided volumes compared to those without DO on 24-hour bladder diary analysis. In the present study, use of a maximum voided volume cutoff of ≤460 ml would capture 88% of all subjects with DO on UDS. By the same token, it would be highly uncommon for patients with DO to report a maximum voided volume more than 460 ml—particularly in the context of frequent self-reported UUI episodes.

Conclusions

A bladder diary appears to be a useful adjunct in the evaluation of older women with SUI. In cases where knowledge of DO is relevant to clinical management, smaller maximum voided volumes may suggest the presence of concurrent DO, whereas a large maximum voided volume may be evidence against the need for more invasive testing. Additional research involving well defined and treatment-naïve patient populations is needed to corroborate the present study findings.

References

- [1] D'Ancona C, et al. *NeuroUrol Urodyn*. 2019 Feb;38(2):433-477
- [2] Giarenis I, et al. *BJU Int*. 2013 Aug;112(4):501-7
- [3] Finazzi-Agro E, et al. *Eur Urol Focus*. 2020 Jan 15;6(1):137-145.