303

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IS A POST-VOID RESIDUAL URINE (PVR)>150ML CLINICALLY RELEVANT IN PATIENTS WITH OBSTRUCTIVE VOIDING SYMPTOMS?

Hypothesis / aims of study
The definition of voiding dysfunction and the cut-off value for post-void residual urine volume (PVR) measurement as an objective measure is still lacking. Recently, a cut-off value of 150 ml for excluding women with voiding dysfunction has been utilized (1). The aim of this study was to compare subjective and objective clinical findings in patients with obstructive voiding symptoms with a PVR>150mL and PVR<150mL.

Study design, materials and methods
Records of women with LUTS who were hospitalized at the urogynecology unit of a University hospital for anti-incontinence and/or prolapse surgery and underwent ambulatory urodynamic monitoring (AUM) were retrospectively reviewed (n=189). Patients with obstructive voiding symptoms were selected using the fifth question of the short form of the Urogenital Distress Inventory (UDI-6); women with a positive response were recruited for evaluation (n=135). All patients underwent a PVR measurement with a Foley catheter within 5 minutes after micturition during the urogynecologic examination. Patients were grouped according to the PVR measurement (Group 1:PVR<150mL and group2: PVR>150mL). Available data for baseline characteristics (age, menopausal status, parity, previous pelvic surgery, chronic disease), clinical examination findings (body mass index, Q-tip test, cough stress test and pelvic organ prolapse staging), voiding diary parameters, validated questionnaires for lower urinary tract symptoms, quality of life and sexual dysfunction (UDI-6, IIQ-7, OAB-V8, PISQ-12) and ambulatory urodynamic monitoring (AUM) findings were compared between the groups. Pelvic organ prolapse (POP) staging was performed using the POPQ system. Ambulatory urodynamic evaluation was performed using the LUNA ambulatory monitoring recorder (MMS^{TM}). Measurement was started after the patients' spontaneous micturition and ended when the patient felt unable to delay voiding; limited to each patient's own single micturition cycle. AUM was performed after reducing POP gently with one or two sponges, in case of POP-Q stage ≥ 2. Interrupted voiding pattern was defined as intermittent urine flow that stopped and started on one or more occasions (2). The Student's t test, Mann–Whitney U test and Chi-square tests were used as appropriate. *P* values < 0.05 were considered significant.

Results
Of the 135 patients, 20 patients (14.8%) had a PVR>150 ml. Baseline characteristics, voiding diary findings, POPQ stages, Q-tip positivity were all similar in the two groups. Cough stress test positivity was significantly higher in patients with a PVR<150mL (50% vs 25%, p=0.035). Symptom bother and QoL questionnaires were all similar except the obstructive subscale of the UDI-6 which were significantly higher in patients with a PVR>150 mL (median 79 vs 50, *p*=0.03). The rate of patients with interrupted voiding pattern on pressure-flow study were significantly higher in patients with a PVR>150ml (45% vs 13.9%, *p*=0.001). Mean Qmax were significantly lower in patients with PVR>150ml (18±7mL/sec vs 25±14nL/sec, *p*=0.004). Qmax was <15mL/sec in 40% (n=8/20) of patients with a PVR>150mL and in 20.8% (n=24/115) of patients with a PVR <150mL (p=0.06). Q max was <12mL/sec in 35% (n=7/20) of patients with a PVR>150mL and in 9% (n=11/115) of patients with a PVR <150mL (p=0.002)

Interpretation of results
Reduced flow rate and/or incomplete bladder emptying are considered as risk factors for the prediction of voiding difficulty after MUS procedures (3). Although PVR estimation is suggested as one of the preoperative evaluation steps for women who are scheduled for an anti-incontinence surgery, the significant amount of PVR is still controversial. In this study, in the PVR>150mL group, significantly more women had an interrupted voiding pattern; maximum flow rate was significantly lower and obstructive symptom bother was significantly worse than the women in the PVR<150mL group. Significantly more women had a Qmax<12mL/sec in this group (35% vs 9%, p=0.02). These findings may suggest that a PVR>150mL may be related with more severe obstructive symptoms. However, still 55% of these patients with a PVR>150 mL had a continuous voiding pattern and 65% had a Qmax>12mL/sec; which implies the lack of precise diagnostic criteria for voiding dysfunction

Concluding message
More studies focusing on the diagnostic criteria for voiding dysfunction in women with obstructive voiding symptoms are needed.

Table 1: Clinical and AUM findings in patients among the groups. (AUM: Ambulatory Urodynamic monitoring, PVR: Post-void residual urine, BMI: Body mass index, COLD: Chronic obstructive lung disease, POP-Q: Pelvic organ prolapse quantification, UDI-6: Short form of the urogenital distress inventory, IIQ-7: Short form of the incontinence impact questionnaire, OAB-V8: Overactive bladder-assessment tool, PISQ12: Short form of the prolapse/incontinence sexual questionnaire, Qmax: Maximum flow rate).

Parameters	**Group1 PVR < 150 ml (n=115)**	**Group2 PVR > 150 ml (n=20)**	***p* value**
Age (years), *mean±SD*	50±11	48±9	0.43
BMI (kg/m2), *mean±SD*	29.5±5.0	31.0±4.5	0.24
Post-menopausal, *n (%)*	66 (57)	10 (50)	0.53
Maximum birth weight (gram), *mean±SD*	3505±513	3495±704	0.95
Diabetes Mellitus, *n (%)*	18 (15.7)	3 (15)	0.62
Hypertension, *n (%)*	41 (35)	6 (30)	0.62
COLD, *n (%)*	14 (12)	1 (5)	0.30

Previous pelvic surgery, *n (%)*	18 (15)	4 (20)	0.62
Positive cough stress test, *n (%)*	55 (50)	5 (25)	0.035
Positive Q-Tip test, *n (%)*	79 (71)	13 (65)	0.57
PVR (ml), *mean±SD*	38±31	230±78	<0.001
POP-Q ≥ stage II			
Anterior, *n (%)*	81 (73)	14 (70)	0.78
Apical, *n (%)*	39 (35)	9 (45)	0.43
Posterior, *n (%)*	49 (44)	13 (65)	0.09
Daily Fluid intake (ml), *mean±SD*	2196±926	2107±630	0.77
Frequency (per 24 hours), *mean±SD*	8.7±3.9	9.5±3.8	0.54
Urinary incontinence (per 24 hours), *mean±SD*	3.9±4.6	2.3±2.4	0.27
UDI-6			
Total, *median (range)*	66 (22-100)	58 (27-91)	0.70
Irritative, *median (range)*	83 (11-100)	74 (16-100)	0.63
Stress, *median (range)*	66 (0-100)	33 (16-100)	0.09
Obstructive, *median (range)*	50 (11-100)	79 (16-99)	0.03
IIQ-7 *median (range)*	47 (0-99)	39 (0-100)	0.29
OAB-V8, *median (range)*	24 (0-40)	20 (0-40)	0.66
PISQ-12, *median (range)*	21 (4-48)	24 (16-48)	0.08
Cystometry parameters			
Duration of AUM (minute), *mean±SD*	98±33	102±31	0.65
Maximum cystometric capacity (mL), *mean±SD*	382±179	509±211	0.09
Urodynamic incontinence, *n (%)*	79 (92)	16 (88)	0.56
Pressure-flow study			
Interrupted voiding pattern, *n(%)*	16(13.9)	9 (45)	0.001
Voided volume (ml), *mean±SD*	341±168	340±155	0.97
PVR (ml), *mean±SD*	45±25	169±133	0.001
Qmax (ml/sec), *mean±SD*	25±14	18±7	0.004
Patients with Qmax<12mL/sec, *n(%)*	11 (9)	7(35)	0.002
Patients with Qmax<15mL/sec, *n(%)*	24(20.8)	8(40)	0.06

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