147

Gärtner M[1], Krhut J[2], Lunacek L[2], Mika D[2], Szabova O[1], Vasek P[1], Zvarova K[3], Zvara P[4]

1. *Department of Gynaecology and Obstetrics, University Hospital, Ostrava, Czech Republic,* ***2.*** *Department of Urology, University Hospital, Ostrava, Czech Republic, Department of Surgical Studies, Ostrava University, Ostrava, Czech Republic,* ***3.*** *Department of Physiology, Slovak Medical University, Bratislava, Slovak Republic,* ***4.*** *Department of Surgery, Department of Urology and Biomedical Laboratory, University of Southern Denmark, Odense, Denmark, Department of Surgical Studies, Ostrava University, Ostrava, Czech Republic*

EVALUATION OF INTRA-INDIVIDUAL TEST-RE-TEST VARIABILITY OF UROFLOWMETRY IN HEALTHY WOMEN AND WOMEN WITH LOWER URINARY TRACT SYMPTOMS.

Hypothesis / aims of study

This is the first study, which evaluate the intra-individual variability of uroflowmetry (UFM) in healthy control subjects and women suffering from stress urinary incontinence, mixed urinary incontinence and overactive bladder. UFM represents a valuable screening tool to identify bladder evacuation dysfunction. The prevalence of disturbances of bladder evacuation is steadily increasing due to rising number of women who undergo radical surgery and/or radiotherapy for pelvic organ malignancies (1). In addition, it often develops as a side effect of anti-incontinence sling procedures (2). The urinary flow rate depends on a number of factors. These factors led to assumption, that there is a wide intra - individual variability of UFM parameters and the test needs to be performed repeatedly. Studies supporting this believe exist, however they are sparse and were exclusively performed in men with or without bladder outlet obstruction. Clear evidence of the variability of UFM parameters in female is missing.

Study design, materials and methods

Total of 105 women suffering from LUTS were enrolled into the study. Based on routine evaluation including history, voiding diary, urine analysis, local physical examination and other diagnostic methods were categorized into three groups. Thirty five we diagnosed as suffering from stress urinary incontinence (Group B), 35 women suffered from mixed urinary incontinence (Group C) and 35 women of OAB both dry and wet (Group D). Additionally, 35 healthy subjects were included into study (Group A). All participants were enrolled after giving an informed consent. The study protocol was approved by ethical committee and the study was conducted in accordance with Declaration of Helsinki. All participants were asked to perform UFM measurement three times. Close attention was paid not to ask the study participants to void at pre-determined time instead they were instructed to perform the test when experiencing a normal desire to void. All measurements were performed according to Good urodynamic practice (3). Following parameters were analyzed: Voided volume (VV), peak flow (Q_{max}), average flow (Q_{ave}), volume-corrected peak flow cQ_{max} ($cQ_{max} = Q_{max}/ \sqrt[2]{VV}$) and volume-corrected average flow ($cQ_{ave} = Q_{ave}/ \sqrt[2]{VV}$). Statistical analysis: the subject variability of UFM parameters was assessed using the analysis of variance on repeated measurements. Relative error was calculated using variation coefficients reported as percent of the average. It means that the average value of UFM parameters as well as the standard deviation was calculated for every subject from repeated measurements. All descriptive characteristics were reported as means ± standard deviation (SD). P-values ≤0.05 were considered statistically significant.

Results

Four hundred and twenty UFM recordings from 140 participants (three recordings for every subject) were analyzed. No statistically significant intra-individual difference in any of the recorded parameters was identified between the three UFM recordings in Groups B, C and D (table 1). The intra-individual variability of following parameters reached statistical significance in patients suffering from stress urinary incontinence (Group B): Q_{max} (p=0.0016), Q_{ave} (p=0.0005) and cQ_{ave} (p=0.0389) (table 2).

Table 1: The recorded parameters divided according to different types of incontinence

Measurement	Parameter	Group A Mean± SD	Group B Mean± SD	Group C C Mean± SD	Group D Mean± SD
UFM[1]	VV (ml)	410.17±180.82	313.74±221.97	236.56±147.89	270.29±163.03
	Q_{max} (ml/s)	34.93±12.68	23.15±11.23	23.83±11.05	28.02±13.03
	cQ_{max}	1.76±0.55	1.42±0.42	1.63±0.56	1.76±0.65
	Q_{ave}	18.92±7.78	13.46±6.99	13.28±6.55	14.97±8.13
	cQ_{ave}	0.95±0.3	0.83±0.27	0.91±0.33	0.92±0.3
UFM[2]	VV (ml)	408.29±184.4	380.26±183.35	260.75±161.23	239.09±117.47
	Q_{max} (ml/s)	33.44±10.78	30.25±14.43	24.31±9.81	26.71±14.32
	cQ_{max}	1.71±0.45	1.61±0.54	1.64±0.58	1.76±0.79
	Q_{ave}	18.08±8.37	17.91±8.9	13.37±6.15	14.04±8.21
	cQ_{ave}	0.91±0.33	0.96±0.35	0.92±0.39	0.91±0.35
UFM[3]	VV (ml)	393.43±216.77	394.37±203.31	270.54±139.66	232.69±103.05
	Q_{max} (ml/s)	31.12±12.26	28.25±11.48	26.14±10.46	26.04±11.96
	cQ_{max}	1.64±0.46	1.52±0.61	1.66±0.58	1.75±0.66
	Q_{ave}	17.28±7.44	17.39±7.46	14.82±6.25	15.54±7.1
	cQ_{ave}	0.92±0.28	0.93±0.4	0.94±0.33	1.02±0.32

Table 2: Results of the intra-individual variability of UFM parameters

Parametr	Group A		Group B		Group C		Group D	
	p	Tukey-Kramer Multiple-Comparison	p	Tukey-Kramer Multiple-Comparison	p	Tukey-Kramer Multiple-Comparison	p	Tukey-Kramer Multiple-Comparison
Volume	0.8693		0.1019		0.2771		0.4653	
Q_{max}	0.0841		0.0016	1≠2, 1≠3	0.5104		0.4908	
cQ_{max}	0.2314		0.0836		0.9801		0.9495	
Q_{ave}	0.3235		0.0005	1≠2, 1≠3	0.4927		0.3571	
cQ_{ave}	0.5547		0.0389	1≠2	0.1302		0.8081	

Interpretation of results

The most appropriate way to assess the accuracy of UFM is through determining the test-re-test reproducibility which reflects the intra-individual variability. Our study documents low intra-individual variation especially when the obtained flow parameters are corrected for the voided volume. In addition, we showed that if patients are allowed to perform the test at the time when they feel the normal desire to void, the voided volume show a very low degree of intra-individual variability. Along with the constant voided volume a high level of intra-individual reproducibility was observe in all flow parameters in all groups except for women suffering from stress incontinence. Even in this group the significant difference was noted only when initial test was compared to the subsequent two tests. High level of consistency was documented between the second and third test with no instance where all three test would be significantly different. This higher test-re-test variability between the first and the subsequent test could possibly be attributed to increase familiarity with the testing condition with the second and third test.

Concluding message

This study support the argument that if properly performed a single UFM test has a high degree of reliability. It is however essential that the test is performed in full compliance with the recommendation of Good Urodynamic Practice. Especially it is important that patient is well instructed and allowed to perform the test at the time when she feels a physiological desire to void. It leads to conclusion that if properly performed a single UFM is highly representative of patient's voiding pattern in both healthy subjects and patients suffering from different types of lower urinary tract disorders.

References

1. Erekson EA, Sung VW, DiSilvestro PA, Myers DL. Urinary symptoms and impact on quality of life in women after treatment for endometrial cancer. Int Urogynecol J Pelvic Floor Dysfunct 2009;20(2):159-63.
2. Wang KH, Neimark M, Davila GW. Voiding dysfunction following TVT procedure. Int Urogynecol J Pelvic Floor Dysfunct 2002 Nov;13(6):353-7
3. Schäfer W, Abrams P, Liao L et al. International Continence Society. Good urodynamic practices: uroflowmetry, filling cystometry, and pressure-flow studies. Neurourol Urodyn 2002;21: 261-74

Disclosures

Funding: None **Clinical Trial:** Yes **Public Registry:** No **RCT:** No **Subjects:** HUMAN **Ethics Committee:** The Ethics Committee of University Hospital, Ostrava, Czech Republic **Helsinki:** Yes **Informed Consent:** Yes