

REPRODUCIBILITY OF URODYNAMIC FILLING SENSATION WITH WEEKLY INTERVAL IN HEALTHY VOLUNTEERS AND IN WOMEN WITH DETRUSOR OVERACTIVITY.

Hypothesis / aims of study

There is an increasing focus on the role of the afferent sensory nerves system in normal micturition as well as in the pathogenesis of detrusor overactivity and overactive bladder symptoms (OAB). The sensory stimuli produced by bladder filling, which are carried by afferent nerves to the afferent nerves to the spinal cord, are accepted thought to cause an increase in sympathetic tone which inhibits the parasympathetic motor drive to the bladder. In normal bladder function the unmyelinated C sensory fibers remain relatively inactive. An increased role of C fibers (or C-fiber hypersensitivity) in these processes is implicated in the pathogenesis of OAB symptoms. Sensation of the bladder can be assessed subjectively during filling cystometry (which largely test proprioceptive sensation)(1). However there is need for more knowledge on standardized evaluation of bladder filling sensations. The study presented here was designed to evaluate bladder filling sensation reproducibility with weekly interval.

Study design, materials and methods

Two populations were studied, 13 female nulliparous volunteers between 20 and 47 years old and 17 female with an OAB between 22 and 65 years old were recruited by advertisement. Healthy was defined as no clinically relevant abnormalities identified by a detailed medical history and physical examination including blood pressure and heart rate. All healthy volunteers were also assessed with a 3-day micturition diary to exclude unrecognized OAB. Overactive bladder subjects were included if they had OAB symptoms of at least 6 months duration and confirmed on a 3-day micturition diary. Subjects with a history of lower urinary tract or pelvic surgery, any intravesical treatment in the past or a documented and untreated urinary tract infection (UTI) at screening were excluded. After screening all included subjects did undergo three investigation periods, each separated by 7 ± 3 days to assess reproducibility.

A three-way 7.4-F cystometry catheter was used for bladder filling. The catheter was introduced transurethrally with non-anesthetic lubricant and fixed to the perimeatal skin. A condom protected rectal balloon catheter was placed at least 10 cm up inside the rectum to measure abdominal pressure. The bladder was emptied completely prior to the cystometric evaluation with residual urine being measured and a sample taken for urinalysis. Cystometry was performed through a 6 channel cystometry equipment. All pressure lines were water filled and connected to external transducers. One lumen of the cystometry catheter was used for bladder pressure measurement, one for measurement of urethral pressure at the highest point of pressure, and one for bladder filling. All detrusor activity was noted. Continuous bladder filling was performed at a constant rate of 30 ml/min in a sitting position with body temperature warm radiocontrast solution. Subjects were asked to report all sensation. First sensation of filling, first desire to void and strong desire to void were marked on the cystometric trace. After voiding, residual volume solution was evacuated, measured and the catheter removed. A single dose of 3mg fosfomycin was given orally as a prophylactic to reduce the risk of urinary tract infection after each test. The recommendations on techniques and terminology of the International Continence Society were used. $P < 0.05$ was considered statistically significant.

Results

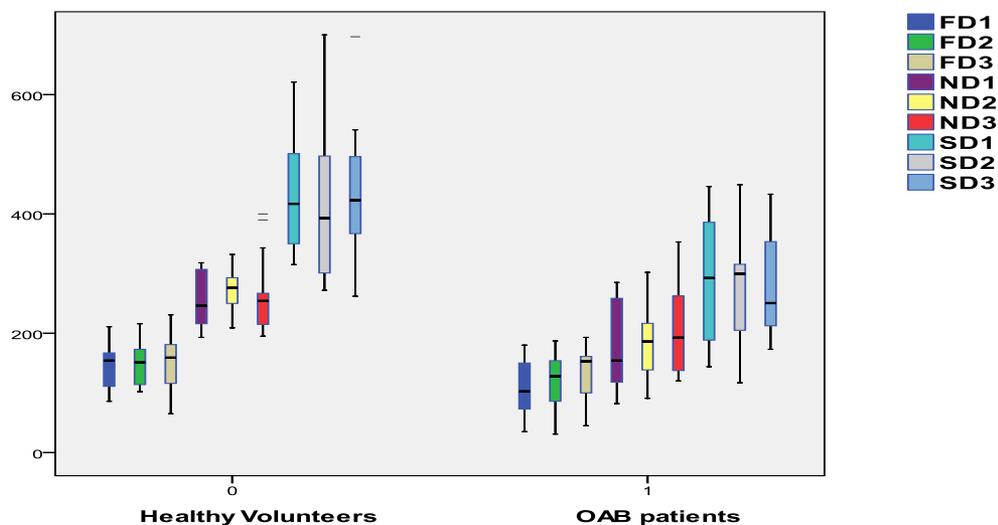
A specific pattern of sensation was reported during bladder filling in all. First sensation of bladder filling, first desire to void and strong desire to void followed each other. Only 1 OAB patient did not report the first sensation of filling once. The sensation of urgency was reported 4 times in 4 different OAB patients, none of the healthy volunteers reported this sensation during bladder filling.

Table 1: Urodynamic data for both groups

Volume at	Test Performance	Healthy Volunteers	OAB patients	P value
First sensation of bladder filling	1 st	142 ± 38	115 ± 45	0.094
	2 th	149 ± 39	114 ± 42	0.025
	3 th	154 ± 46	127 ± 42	0.106
First desire to void	1 st	257 ± 47	179 ± 71	0.002
	2 th	274 ± 38	185 ± 56	0.000
	3 th	266 ± 68	202 ± 72	0.020
Strong desire to void	1 st	435 ± 103	277 ± 105	0.000
	2 th	418 ± 135	265 ± 90	0.001
	3 th	434 ± 110	265 ± 80	0.000

Consecutive sensations corresponded to statistically higher bladder volumes (χ^2 , $P=0.000$). Volumes (mL), at which different sensations of bladder filling were reported, were compared between healthy volunteers and OAB patients. Significant differences were found at first sensation of bladder filling ($P = 0.003$), at first desire to void ($P = 0.000$) and at strong desire to void ($P = 0.000$). Partial correlation was used to explore the relationship between the reported filling sensations and the repeated filling cystometry with weekly interval. Figure 1 illustrated the strong positive partial correlation.

Figure 1: Box plot presentation of volumes at reported filling sensations in healthy volunteers and OAB patients with weekly interval. FD: first sensation of bladder filling; ND: first desire to void; SD: strong desire to void.



Interpretation of results

Filling sensation is a most physiological way of correspondence between bladder and the individual and the prerequisite for voluntary control. Bladder filling sensation has been extensively studied. Its reproducibility has been evaluated before in patients. Now we controlled 3 times with a week interval and our results showed a strong correlation in healthy volunteers as well as in patients. The expected significant different volumes between OAB patients and healthy are also shown in this study.

Concluding message

Our data clearly demonstrate that filling sensation performed with weekly interval is highly reproducible in healthy and OAB patients. Repeated filling cystometry may be a useful tool in the assessment of the afferent sensory nerves system.

References

1. Wyndaele J.J., De Wachter S. Cystometrical Sensory Data from a Normal Population: Comparison of Two Groups of Young Healthy Volunteers Examined with 5 Years Interval. *European Urology* 2002;42:34-38

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Was the Declaration of Helsinki followed?	Yes
Was informed consent obtained from the patients?	Yes