

FACTORS RELATED TO THE VOIDING PATTERN IN WOMEN WITHOUT VOIDING SYMPTOMS

Hypothesis / aims of study: Most of our knowledge of voiding function in women has been extrapolated from studies of patients with lower urinary tract dysfunction. Few studies have described the voiding patterns of "healthy, continent and/or asymptomatic" women. All women included in these reports voided with a measurable detrusor contraction and variable participation of abdominal muscles, which might be considered the normal voiding pattern. Definitions of what is considered detrusor contraction and abdominal contraction during voiding vary between these studies. It has been declared that only patients with low urethral closure pressure void with negligible or no detrusor contraction, which leads to question if these types of voiding are indeed normal. The aim of this study was to describe the voiding pattern in women without voiding symptoms and compare clinical and urodynamic characteristics between women who urinate using detrusor contraction (with or without participation of abdominal muscles) and women who do not use detrusor contraction. To our knowledge this is the first study to investigate this.

Study design, materials and methods

In a three year period, 580 consecutive women underwent conventional cystometry following "good urodynamic practices". At the time of examination and in a standardized manner, symptoms were obtained by a directed anamnesis as being either present or absent without any stratification for severity. We included patients without voiding symptoms (slow stream, straining to void and intermittent stream) and excluded those with: a) previous lower urinary tract surgery, b) pelvic organ prolapse > stage II, c) pelvic radiotherapy, d) medications active on the lower urinary tract, e) bladder pain syndrome/interstitial cystitis, f) insulin-dependent diabetes mellitus and g) neurological diseases. In the pressure-flow study, detrusor contraction (Det-cont) was defined as an increase of detrusor pressure at maximum flow rate ≥ 10 cm H₂O over baseline and abdominal contraction (Abd-cont) as an increase of abdominal pressure at maximum flow rate ≥ 10 cm H₂O over baseline. Four voiding patterns were determined: a) voiding using Det-cont, b) voiding using Det-cont and Abd-cont, c) voiding using Abd-cont and d) voiding without Det-cont or Abd-cont. Patients were classified according to their: a) age (≤ 50 or > 50 years old), b) history of hysterectomy, c) symptoms of stress, urgency or mixed urinary incontinence, d) presence of detrusor overactivity and e) degree of sphincteric deficiency (abdominal leak point pressure < 100 or ≥ 100 cm H₂O). We compared these variables between women who voided using Det-cont (with or without Abd-cont) and those who do not (women that voided using Abd-cont and women that voided without Det-cont or Abd-cont). Either Student's *t* test or Wilcoxon rank-sum test was used to compare the numerical variables. Either the chi-square test or Fisher's exact test was used to compare the categorical variables. The odds ratios were calculated. The multivariate analysis was performed with the logistical regression method. The information was processed with the Stata 12.1 program (StataCorp, 2012), and statistical significance was defined as $P < 0.05$.

Results

One hundred eighty six women age 58 ± 10.7 (range 24 – 83) years formed the study group. Table 1 shows some of their clinical and urodynamic characteristics. The vast majority of women voided using Det-cont with or without Abd-cont (77.4%). Women that voided using Det-cont with or without Abd-cont were significantly younger than the others (56.8 ± 10.8 versus 62.2 ± 9.6 years, $p=0.004$), had similar maximum flow rates (26 ± 8.8 versus 28 ± 11.5 mL/s, $p=0.513$) and had not significantly different post void residual volumes (9 ± 33 versus 17 ± 58 mL, $p=0.667$) than the others. Table 2 shows the univariate and multivariate analysis of the variables associated with voiding using Det-cont with or without Abd-cont.

Interpretation of results

The classic description of voiding patterns in women did not provide information on symptoms of the women studied. This study included only women without voiding symptoms and excluded many factors that can alter lower urinary tract function. Although they are not completely healthy individuals (due to detrusor overactivity and urodynamic stress urinary incontinence during the filling phase), we think that these results give a good approximation to the voiding phase of normal women. Statistically significant association between age and degree of sphincteric deficiency with voiding using Det-cont (with or without Abd-cont) suggest that voiding pattern may vary with ageing and changes in the sphincteric deficiency status. These factors should be taken into consideration when analyzing the voiding phase in women. Further studies are required to define normal and abnormal voiding patterns in women.

Concluding message: The vast majority of women without voiding symptoms voided using Det-cont with or without Abd-cont. Voiding pattern may vary with ageing and changes in the degree of sphincteric deficiency.

TABLE 1. CLINICAL AND URODYNAMIC CHARACTERISTICS OF WOMEN WITHOUT VOIDING SYMPTOMS (n = 188)

Variable	Results
Age (years) mean ± SD (range)	58 ± 10.7 (24 – 83)
≤ 50 years	42 (22.6%)
Previous hysterectomy	39 (21%)
Symptoms of	
Stress urinary incontinence	42 (22.6%)
Urgency urinary incontinence	7 (3.8%)
Mixed urinary incontinence	134 (72%)
Other types of urinary incontinence	3 (1.6%)
Detrusor overactivity	93 (50%)
Urodynamic SUI ^{a)}	152 (81.7%)
ALPP ^{b)} ≥ 100 cm H ₂ O	114 (75% ^{c)})
Voiding pattern	
Det-cont ^{d)}	102 (54.8%)
Det-cont + Abd-cont ^{e)}	42 (22.6%)
Abd-cont	16 (8.6%)
Absence of Det-cont and Abd-cont	26 (14%)

- a) SUI: stress urinary incontinence
- b) ALPP: abdominal leak point pressure
- c) % of the patients with urodynamic SUI
- d) Det-cont: detrusor contraction
- e) Abd.cont: abdominal contraction

TABLE 2. UNIVARIATE AND MULTIVARIATE ANALYSIS OF VARIABLES ASSOCIATED WITH VOIDING USING DETRUSOR CONTRACTION WITH OR WITHOUT ABDOMINAL CONTRACTION

UNIVARIATE ANALYSIS			
Variable	P value	Odds ratio	95% CI ^{a)}
Age ≤ 50 years	0.006	7.692	1.775 – 33.326
Previous hysterectomy	0.934	0.964	0.416 – 2.234
Symptoms of urinary incontinence	0.288	1.236	0.836 – 1.828
Detrusor overactivity	0.038	2.127	1.044 – 4.332
Urodynamic SUI ^{b)} : ALPP ^{c)} ≥ 100 cm H ₂ O	0.041	2.307	1.34 – 5.148
MULTIVARIATE ANALYSIS			
Variable	P value	Odds ratio	95% CI ^{a)}
Age ≤ 50 years	0.005	8.485	1.877 – 38.351
Detrusor overactivity	0.065	2.166	0.953 – 4.921
Urodynamic SUI ^{b)} : ALPP ^{c)} ≥ 100 cm H ₂ O	0.016	2.937	1.220 – 7.069

- a) CI: confidence interval
- b) SUI: stress urinary incontinence
- c) ALPP: abdominal leak point pressure

Disclosures

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