BLADDER CONTRACTILITY INDEX (BCI), PROJECTED ISOVOLUMETRIC PRESSURE 1 (PIP1)



AND VBN CONTRACTILITY PARAMETER (k).



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HYPOTHESIS / AIMS OF STUDY

Evaluation of detrusor contractility in women remains a great challenge. Previous studies were attempts to evaluate detrusor contractility in men using a bladder contractility index (BCI) [1]. This index is calculated from detrusor pressure at maximum flow $p_{det,Qmax}$ and maximum flow $p_{det,Qmax}$ and maximum flow $p_{det,Qmax}$ with the following formula: $p_{det,Qmax}$ + $p_{det,Qmax}$

Suitability of this formula has been discussed for women because it led to a great overestimation and a simple index called projected isovolumetric pressure 1, (PIP1 = $p_{det.Qmax} + Q_{max}$) has been proposed [2]. Recently a nomogram, based on the VBN mathematical model, has been proposed to evaluate detrusor contractility (parameter VBN k) in women from $p_{det.Qmax}$, Q_{max} and initial bladder volume (V_{ini}); the curves were fitted by algebraic equations easily programmable in Excel [3] (software available at favalentini@gmail.com).

For the first time, analysis of detrusor contractility can be proposed in a large female population.

So, the aims of this study were to compare BCI, PIP1 and k in a population of non-neurological women referred for evaluation of various lower urinary tract symptoms and to search for the influence of age, main complaint and urodynamic diagnosis.

STUDY DESIGN, MATERIAL AND METHODS

Urodynamic tracings obtained during cystometry (triple lumen urethral catheter 7F) and intubated flow (IF) of non-neurologic women referred for investigation of various LUTS were analyzed. Post void residual volumes (PVR) were measured using a Bladder-scan. The initial bladder volume was V_{ini} = voided volume + PVR.

Exclusion criteria were to be unable to void and/or expelled catheter during IF, voided volume either from FF or IF <100 mL and prolapse of grade ≥ 2.

In the contrary of BCI and PIP1, k was without unit.

RESULTS

Retrospectively 449 urodynamic tracings of non-neurologic women were analyzed. Mean age was 59 ± 16 years [20-96 y]. Main complaint was urinary incontinence: stress (96 SUI), mixed (140 MUI), urge (118 UUI). Women with various complaints without incontinence (95 women) were called OTHER; among them, 38 had frequency (FR) and 16 dysuria (D).

1- Age (table)

Looking at age sub-groups defined as "reproductive (< 45 y)", "peri-menopause (46-65 y)" and "post-menopause (> 65y), BCI, PIP1 and k decreased with ageing, each sub-group being significantly different of the others.

2- Main complaint (table)

There was no significant difference in BCI except between MUI vs. Other (p= .0259) while PIP1 was significantly higher in UUI vs. Other (p= .0161) and k in UUI vs. SUI (p=.0107), vs. MUI (p=.0010) and vs. Other (p= .0224).

	SUI (96)	MUI (140)	UUI (118)	OTHER (95)
BCI	94.8±35.6	100.0±41.7	93.5±35.1	88.8±36.6
PIP1	38.7±19.2	38.7±17.7	41.9±19.6	35.8±16.4
k	0.30±0.34	0.28±0.33	0.43±0.46	0.30±0.29

94.4±33.0

38.7±16.8

.355±.362

83.8±36.9

32.5±14.6

.260±.388

113.2±37.1

49.4±20.2

.588±.474

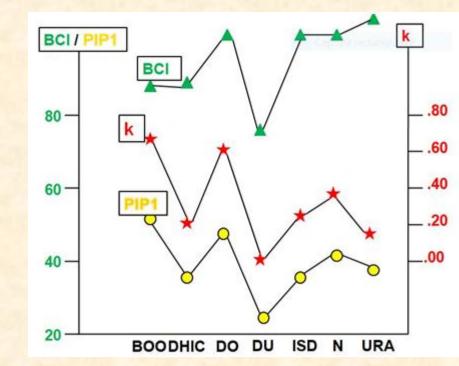
3- Urodynamic diagnosis (Figure)

After urodynamic session, a urodynamic diagnosis (UD) was posed according to the ICS/IUGA recommendations. UD were bladder outlet obstruction (BOO), detrusor overactivity with impaired contractility (DHIC), detrusor overactivity (DO), detrusor underactivity (DU). Some investigations were found "normal" (N) and other related to urethral dysfunction (intrinsic sphincter deficiency (ISD) or voiding triggered by urethral relaxation (URA)).

Some surprising results: a- a low value of BCI for BOO vs. DO while PIP1 and k values were high and similar for these two UD

b- a relatively high value of BCI for DHIC close to the value for

BOO while PIP1 and k were low.



INTERPRETATION OF RESULTS

Evaluations of BCI and PIP1 are obtained from data (p_{det.Qmax} and Q_{max}) of intubated flow. Same data are used to compute the VBN contractility parameter k using the associated nomogram; although computation of k uses a volume correction.

Detrusor contractility is found decreasing with ageing whatever the indices or parameter.

PIP1 and k give similar results for detrusor contractility. More the value of contractility is found compatible with previous results: average when urodynamic diagnosis is « normal », low for detrusor underactivity, high for detrusor overactivity and bladder outlet obstruction [3]. This consistency shows the reliability of the evaluations using VBN parameter k and PIP1 while BCI has many inconsistencies (Figure).

CONCLUDING MESSAGE

An evaluation of detrusor contractility in women from data of intubated flow is easily obtained using indices BCI and PIP1 or using the nomogram giving VBN parameter k. Comparison of results show that PIP1 and parameter k give comparable and consistent results with urodynamic diagnosis while BCI leads to inconsistencies.

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