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EVALUATION OF OBSTRUCTION DUE TO BENIGN PROSTATIC ENLARGEMENT (BPE): VBN METHOD VERSUS USUAL GRADING SYSTEMS.

Aims of Study

There are 2 approaches to anlyze the voiding of BPE patiets. 1) In the standard approach [1], obstruction and contractility parameters are calculated at the point of maximum flow; the Abrams-Griffiths (A-G) number or OCO (obstruction coefficient), the provisional ICS nomogram and the group-specific resistance factor (URA) may be used to grade obstruction, the Schäfer nomogram and the PIP/BCI (projected isovolumetric pressure/bladder contraction index) and DECO (detrusor coefficient) parameters to grade detrusor contraction strength. A more sophisticated number is the Watts factor (WF) [2]. 2) In the VBN approach [3], the whole pressure-flow tracing is fitted by a physiological model, using an automated computing calculation, and 2 parameters are deduced which respectively quantify the urethral obstruction (prostatic urethral counter-pressure pucp) and the detrusor contraction strength (detrusor force coefficient k). Our goal was to compare the merits of these methods.

Methods

Each set of parameters was computed for a population of 71 patients [age range: 45-86 years] with lower urinary tract symptoms (LUTS) associated with BPE; 47 files included 2 interpretable pressure-flow studies (PFs) while 24 files had only interpretable PFs. Relations between standard and VBN parameters were examined graphically and by correlation coefficients. Test-retest reliability and inter-rater reliability of the VBN parameters were investigated.

Results

1) Test-retest reliability of the VBN parameters gives ?k = 0.016 ± 0.081 and ?pucp = 0.33 ± 4.03 cm H_2O while the test-retest reliability of the standard grading parameters gives ? A-G = 3.0 ± 13.7 cm H_2O, ?PIP = 2.2 ± 17.3 cm H_2O and ?mPIP = 3.2 ± 13.4 cm H_2O; inter-rater reliability of the VBN parameters gives ?k = - 0.01 ± 0.13 and ?pucp = - 0.3 ± 7.0 cm H_2O.
2) The obstruction and the detrusor contraction strength are linked phenomena: the (k, pucp) correlation coefficient is found to be fairly high (R = 0.900). Correlation coefficients between standard and VBN parameters are given in the table:

	A-G	OCO	URA	PIP	mPIP	WF
k	0.904	0.911	0.791	0.853	0.962	0.955
pucp	0.992	0.995	0.969	0.673	0.930	0.964

The VBN urethral obstruction parameter is linearly linked to the A-G number (R = 0.992); so it is very simply related to the provisional ICS obstruction nomogram: pucp = 0.706 (A-G + 6.18) in cm H_2O. The VBN detrusor contraction strength parameter is rather weakly related to the standard contractility parameters. However, a simple modification to the standard index PIP yields a mPIP parameter (mPIP = $p_{det.Qmax}$ + 1.7Q_{max}) strongly associated with the VBN detrusor contraction strength (R = 0.962): k = 0.0233 (mPIP – 21.6) where PIP is expressed in cm H_2O.
3) A-G, OCO and URA parameters are sensitive to changes in catheter diameter while WF, PIP/DECO and mPIP are sensitive to increase in bladder filling volume. VBN analysis reveals that minor phenomena, such as premature fading of the detrusor contraction, are responsible for much of the void-to-void variability of pressure-flow studies.
Consequently, the primary VBN obstruction and contraction strength parameters exhibit better test-retest and inter-reliability than the standard parameters, and are less sensitive to changes in testing circumstances (bladder volume, urethral catheter size and psychological factors).

Conclusions

In the standard approach, a set of 2 numbers: A-G and m-PIP, derived from pressure-flow studies best characterizes qualitatively the patient's voiding status. It is simple to calculate, but is sensitive to testing variations and variable minor phenomena. The VBN approach is more complicated but gives parameters, representing obstruction and detrusor contraction strength, that are much less dependent on testing variations and have better reliability.

[1] 5th International Consultation on BPH, Paris 2000. 226-81; [2] Am J Physiol 1986. 251: R225-R230; [3] Neurourol Urodyn 2000. 19: 153-76.