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PREDICTIVE POTENTIAL OF VBN METHOD COMPARED TO OTHER OBSTRUCTION GRADING SYSTEMS

Aims of Study
Different semi-empirical methods such as Abrams-Griffiths (AG) number, Schäfer's classification and group-specific resistance factor (URA) have been proposed to quantify bladder outlet obstruction (BOO) due to benign prostatic enlargement (BPE). All use the pressure-flow diagram and the critical reference point: $p_{detQmax}, Q_{max}$. We have developed a micturition mathematical model [1] which allows to describe the obstructive status of a BPE patient by two parameters (VBN parameters): one, pucp (prostatic urethra counter-pressure) characteristic of the compressive urethral obstruction, the other k (detrusor force coefficient) characteristic of detrusor efficiency. This study focused on the relationship between accepted BOO criteria and VBN parameters.

Methods
The VBN parameters were derived from pressure-flow studies (P-Fs) in 71 BPE patients. In 48 patients who underwent 2 P-Fs, no difference in k and pucp values was noted in both studies. Thus, these parameters were found independent of the conditions of the urodynamic investigation (bladder volume, urethral catheter size). The ranges were [0-150 cm H2O] for pucp and [0.4-4.0] for k [2]. Over two hundred theoretical calculations allowed to draw nomograms for (k, pucp) corresponding to the $p_{detQmax}$, Q_{max} data set from which it became possible to determine correlations between [pucp,k] and the other BOO grading methods.

Results
From AG number and Schäfer nomogram we found a condition of obstruction depending on pucp: unobstructed (p – 2Q < 20 cm H_2O) and Schäfer' grades 0-I were compatible with pucp < 25 cm H_2O, obstructed (p – 2Q > 40 cm H_2O) and Schäfer's grades III and above with pucp > 35 cm H_2O. From Schäfer nomogram for detrusor contraction strength we found boundaries depending only slightly on pucp for obstructed patients (pucp > 35 cm H_2O).Then, the normal detrusor contraction strength area was roughly 1.25 < k < 2.0. For unobstructed patients, boundaries mixed detrusor (k) and urethra (pucp) conditions. From URA criterion, we found conditions which could not be related to urethra or to detrusor but implied a mixed participation (parabolic curves).

Conclusions
VBN method introduces two new parameters, urethral obstruction and detrusor force coefficient, to quantify the effects of BPE. These parameters were found independent of the conditions (individual and technical) of the urodynamic investigation. The status of a BPE patient in terms of pucp and k is highly compatible with the results of the P-Fs analysis using AG number or Schäfer nomogram. Future application of the VBN method should allow to follow BPE patients longitudinally and possibly document changes in detrusor function with time with a large use of non-invasive free uroflows.

[1] Neurourol Urodyn 2000; 19: 153-176
[2] J Urol 2000; 163(4): 226