

EVALUATION OF BLADDER OUTLET OBSTRUCTION IN MEN WITH BENIGN PROSTATIC ENLARGEMENT USING PENILE CUFF TEST: NEWCASTLE NOMOGRAM VS ABRAMS-GRIFFITHS NUMBER AND VBN PARAMETERS.

Hypothesis / aims of study

In men with benign prostatic enlargement (BPE), the main problem is to evaluate the bladder outlet obstruction (BOO). An unquestionable approach uses the analysis of pressure-flow studies PFs. From these tests, some nomograms and numbers have been proposed, the more used being the ICS nomogram and the Abrams-Griffiths number. If PFs are considered as the gold standard, they have great disadvantages: they are invasive, time consuming, expensive and carry some morbidity to the patient. Some non invasive methods have been proposed like the penile cuff test [1]. On the other hand, the D index [2] derived from the VBN method allows to obtain from only a free uroflow a relationship between the VBN parameters which characterized the urethral obstruction (pucp) and the detrusor contractility (k); these VBN parameters (little dependent of the conditions of testing) are respectively closely correlated with the AG number and both the Watt-factor and the modified projected isometric pressure mPIP ($p_{det.Q_{max}} + 1.7Q_{max}$) [3].

The aim of this preliminary study is to compare the evaluations of BOO obtained using these three methods.

Study design, materials and methods

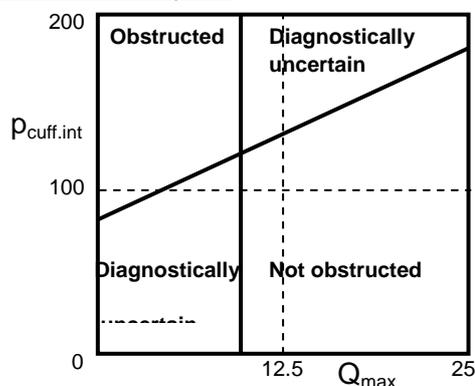
Seven files of patients suspected of BPE were retrospectively analysed. Each file consisted of one penile cuff test and one free uroflow (FF) performed the same day. The analysis consisted of four steps:

- 1- The penile cuff test leads to a classification according with the Newcastle nomogram.
- 2- The D index was computed from the FF and from the flow of the first inflation-deflation cycle of the cuff test. It gave the VBN parameter pucp (prostatic urethral counter-pressure) for the k (detrusor force) = 1 and defined a family of equivalent voids (same flow curve but different detrusor pressure curves) [2].
- 3- Applying this property of D index and using the VBN method, the timing of flow and cuff pressure curves of the whole penile cuff test was used to evaluate the real values of pucp and k.
- 4- Then, pucp and k values were used to compute a theoretical voiding (initial bladder volume = 300 mL, urethral catheter 6F) from which we obtained Q_{max} and $p_{det.Q_{max}}$ and the AG number = $(p_{det.Q_{max}} - 2Q_{max})$.

At last the three evaluations of BOO were compared: Newcastle nomogram, VBN parameters and AG number.

Criteria for diagnosis of BOO:

Newcastle nomogram:



VBN parameters: not obstructed: $pucp < 18.5 \text{ cm H}_2\text{O}$; equivocal: $18.5 \text{ cm H}_2\text{O} \leq pucp \leq 32.5 \text{ cm H}_2\text{O}$; obstructed: $pucp > 32.5 \text{ cm H}_2\text{O}$.

AG number: not obstructed: $AG < 20$; equivocal: $20 \leq AG \leq 40$; obstructed: $AG > 40$.

Results

1- D index (cm H₂O) from cuff and free uroflow (Table 1)

	1	2	3	4	5	6	7
FF	35	21	abdominal straining	27	12	$V_u < 100\text{mL}$	25
Cuff	35	21	29	32.5	12	30	26

2- Evaluation of obstruction (Table 2): in bold good agreement between the three evaluations

	Newcastle nomogram	VBN parameters pucp	k	AG number
1	obstructed	110 (obstructed)	2.8	131 (obstructed)
2	not obstructed	27 (equivocal)	1.2	33 (equivocal)
3	equivocal obstructed	52 (obstructed)	1.7	65 (obstructed)

4	equivocal obstructed	74 (obstructed)	2.0	91 (obstructed)
5	obstructed	67 (obstructed)	4.0	107 (obstructed)
6	obstructed	66 (obstructed)	2.0	84 (obstructed)
7	equivocal obstructed	16 (not obstructed)	0.72	18 (not obstructed)

Interpretation of results

Agreement of D values from FF and cuff test is good in 4/7 (57%) patients.

Agreement between the conclusions obtained from pucp and AG number results from the high correlation between these two parameters.

The slight discrepancies between the classifications obtained from Newcastle nomogram and both pucp and AG number (pts # 2-3-4) could be mainly explained by difficulties to determine exactly the cuff pressure at which flow ceases ($p_{cuff.int}$); in addition, there are sources of variability: imperfect transmission of cuff pressure to the urethra, physiological variability of bladder pressure at flow interruption.

Patient # 7 evokes another problem: it appears as not obstructed from pucp and AG but equivocal obstructed from the cuff. The answer is given by the VBN parameter k (= 0.72): this patient has an impaired detrusor function.

Concluding message

Diagnostic category is almost in good agreement using one or the other method of evaluation of BOO. The only problem is the evaluation of patients with impaired detrusor function which could be only made using the VBN method, the Watt-factor or the m-PIP. That last result needs to be validated on a larger population.

References

1. J Urol 2005; 52: 186
2. BJU International 2008; 101: 995-999
3. Ann Readap Med Phys 2005; 48: 11-19

<i>Specify source of funding or grant</i>	None
<i>Is this a clinical trial?</i>	No
<i>What were the subjects in the study?</i>	HUMAN
<i>Was this study approved by an ethics committee?</i>	No
<i>This study did not require eithics committee approval because</i>	It is a retrospective study from a database.
<i>Was the Declaration of Helsinki followed?</i>	Yes
<i>Was informed consent obtained from the patients?</i>	No