

NON INVASIVE URODYNAMICS: THE PENILE CUFF TEST IN PATIENTS CANDIDATE TO TURP

Hypothesis / aims of study

Pressure flow study (PFS) is considered the standard procedure to diagnose bladder outlet obstruction (BOO). Nevertheless, PFS is an invasive test, with possible morbidity; furthermore, it is time consuming and costly. For this reason, research has been performed, with the aim to develop a non invasive examination, able to assess BOO. The penile cuff test has been proposed (1) as a non invasive tool to assess BOO. In the penile cuff test, a cuff is placed around the penis before voiding urine (see figure 1). This is automatically inflated during the voiding process to stop urine flow, and then deflated again. The inflation/deflation cycle is repeated several times during a single emptying of the bladder and the cuff pressure needed to stop the flow of urine is determined. This provides a measure of the fluid pressure generated in the bladder which is used to distinguish BOO from problems associated with under-active bladder muscle. Few data have been published about correlations between penile cuff test and PFS findings (2). Aim of the present study was to investigate these correlations and to evaluate the role of the penile cuff test in the diagnosis of BOO.

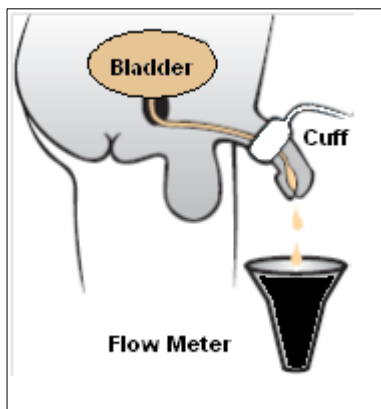


Fig. 1

Study design, materials and methods

48 consecutive male patients (mean age 61,5 \pm 13,1 yrs) reporting lower urinary tract symptoms (LUTS) and possible candidates for a trans-urethral resection of the prostate (TUR-P) were evaluated by means of the penile cuff test and by standard PFS. The penile cuff test was performed using the CT3000 cuff machine (Mediplus Ltd, UK). This instrument is able to take multiple measurement of cuff pressure required to stop urine flow (Pcuff int) during an episode of micturition.

This pressure is related to the bladder isovolumetric pressure (BIP), e.g. the pressure recorded intravesically during the micturition when the flow is stopped. A low urine flow and a high BIP indicate the presence of BOO, whilst a low urine flow with a low BIP suggests a diagnosis of detrusor underactivity. For this study, the nomogram proposed by Griffiths (2) was used (fig.2).

In this nomogram, having on the vertical axis the P cuff int and on the horizontal axis the Q max recorded, an oblique line, intercepting the vertical axis at 80 cmH₂O, separate the obstructed from the non obstructed patients. It has been postulated that the prognostic value of the test can be increased, further separating patients showing Qmax \geq 10ml/s from those showing Qmax < 10ml/s (2). Patients were thus divided in four groups: A) obstructed patients with Qmax < 10ml/s, B) obstructed patients with Qmax \geq 10ml/s, C) unobstructed patients with Qmax < 10ml/s, D) unobstructed patients with Qmax \geq 10ml/s. The results of the PFS evaluation were used to establish the positive and negative predictive factor of the penile cuff test for obstruction.

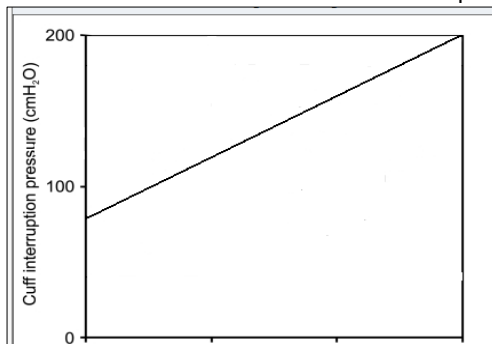


Fig. 2

Results

At the penile cuff test, 31 patients were diagnosed as “obstructed”: 15 of them (group A) showed a Qmax <10ml/s, while 16 (group B) showed a Qmax ≥10ml/s. On the other hand 17 patients were considered “unobstructed”, 5 (group C) showing a Qmax <10ml/s and 12 (group D) showing a Qmax ≥10ml/s.

None of the 17 patients being diagnosed as “unobstructed”, at the penile cuff test, were diagnosed as obstructed at PFS (negative predictive value –NPV- for obstruction 100%); 21 out of 31 patients being diagnosed as “obstructed”, at the penile cuff test, were diagnosed as obstructed at PFS (positive predictive value –PPV- for obstruction 67,7%). Only one out of the 31 patients “obstructed” at the penile cuff test was considered unobstructed at PFS. NPV and PPV for obstruction were not particularly changed by the further stratification of the patients on the basis of their Qmax: in group A, PPV for obstruction was slightly lower than in the general obstructed patients population (66,7%); in group D NPV for obstruction was 100% as in the general population. Penile cuff test sensibility and specificity for obstruction were 100% and 63% respectively. Results are summarized in table 1.

Table 1

Penile cuff test	PFS		Total
	Obstructed	Unobstructed/Equivocal	
Obstructed	21	10	31
Unobstructed	0	17	17
Total	21	27	48

Interpretation of results

In our experience, the penile cuff test is a reliable tool to determinate absence of BOO, with a NPV for BOO (as diagnosed by PFS) of 100%. This finding is higher than what observed by Griffiths (2), who found a NPV of 78%. On the other hand, PPV for BOO found in the present study (67,7%) is comparable to that reported by Griffiths (68%). PPV and NPV, contrary to what found previously, were not modified separating patients with Qmax ≥10ml/s, from those with Qmax <10ml/s. We were not able to explain these different findings, but the different enrolment criteria could be responsible of such differences in results. In fact, in our study, all patients underwent urodynamics because they were possible candidates for a TUR-P and were not referred by other centres, thus excluding patients with higher Qmax.

In any case, in this patients population, the penile cuff test is highly reliable to exclude presence of BOO; on the other hand, around a third of the patients considered obstructed are diagnosed as “equivocal” at PFS, with only one patient diagnosed as “unobstructed”. We believe that these findings support a possible role of the penile cuff test in the preoperative evaluation of patients candidate to a TUR-P as previously suggested by Harding (3).

Concluding message

The penile cuff test showed a NPV and a PPV for BOO of 100% and 67,7% respectively in a population of patients candidates for a TUR-P. We believe that these findings support a possible role of the penile cuff test in the preoperative evaluation of patients candidate to a TUR-P.

References

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Disclosures

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