

CHANGE IN BLADDER CONTRACTION STRENGTH FOLLOWING TURP

Hypothesis / aims of study

Isovolumetric bladder pressure ($p_{ves, isv}$) is an accepted indicator of detrusor contraction strength and can now be measured non-invasively using techniques such as the penile cuff test¹. This technique uses the controlled inflation of a penile cuff to a pressure sufficient to interrupt voiding ($p_{cuff, int}$), which represents a valid and reliable estimate of $p_{ves, isv}$ ². Pressure and flow measurements taken during the cuff test can be plotted on a proposed nomogram to diagnose bladder outlet obstruction². It has previously been reported that detrusor contraction strength increases following medical treatment for benign prostatic enlargement (BPE)³. The present study aimed to investigate changes in bladder contraction strength occurring after surgical treatment for BPE by comparing non-invasive pressure and flow data provided by the cuff test. Our null hypothesis was that $p_{cuff, int}$ (representing contraction strength) was unchanged following TURP.

Study design, materials and methods

Following ethical approval and with written informed consent we prospectively recruited men already selected for TURP from a single centre. A penile cuff test and symptom assessment (IPSS score) was performed the day prior to surgery. The maximum value of $p_{cuff, int}$ was measured for each individual by using a cursor on a computerised pressure flow plot. All patients were invited to undergo a second cuff test and symptom assessment 4 months following their surgery. The difference between pre-operative and 4-month post-operative $p_{cuff, int}$, representing the change in strength of contraction, was calculated for each individual and significance examined by Student's t-test. We also examined the relationship between change in contraction strength within each subject and their pre-operative obstruction category derived from the proposed non-invasive nomogram using Student's t-test. In order to investigate the timing of possible change in contraction strength we tested a sub-group of 10 consecutive patients 2 months post-operatively.

Results

Over a 2-year period we recruited 194 men with median (range) age of 68 (47-88) years. Histological BPH was confirmed in all cases. From this group we obtained valid measurements of $p_{cuff, int}$ before and after surgery for 132 (68%) subjects. The post-operative measurement took place at a median (range) of 134 (65-200) days after TURP. Overall, mean (SD) $p_{cuff, int}$ decreased from 139 (36) cmH₂O to 108 (30) cmH₂O ($P < 0.01$, Figure 1). The magnitude of change in $p_{cuff, int}$ was significantly greater in those classified pre-operatively as having BOO using the proposed non-invasive nomogram (Table 1). Valid paired data were obtained from 9 men who were tested 2 months after surgery. For this sub-group mean (SD) $p_{cuff, int}$ decreased from 133 (41) cmH₂O to 98 (26) cmH₂O following TURP ($P < 0.05$).

Interpretation of results

Our data show a significant decrease in isovolumetric bladder pressure measured non-invasively in symptomatic men with BPH following TURP. We feel that these results are most likely to represent a decrease in bladder contraction strength that occurs within the first two months following surgery to remove BOO. This contention is supported by our finding of significantly greater changes in obstructed patients. The large sample size, paired design and findings of previous studies make it unlikely that measurement error contributed to the change in $p_{cuff, int}$. Another alternative explanation would be bias in estimation of $p_{ves, isv}$ by $p_{cuff, int}$ caused by the increased flow rate seen in most men following TURP. Our earlier studies showed that accuracy of estimation of $p_{ves, isv}$ by $p_{cuff, int}$ was similar across wide range of values for Q_{max} .

These observed changes may represent a return towards normal detrusor contractility from previous increased contractility required to compensate for relative outflow obstruction. Previous findings of increased contraction strength following medical treatment of symptomatic BPE used a different measure of contractility, the Watts factor (WF)³. We intend

to determine in future studies whether we can calculate WF from our invasive data and assess whether this measure demonstrates an equivalent change to that seen for $p_{\text{cuff.int}}$.

Concluding message

The consistent fall in non-invasively measured isovolumetric bladder pressure represents a compensatory decrease in detrusor contraction strength following removal of BOO by TURP.

Figure and Table

Figure 1 Graphical representation of mean changes in $p_{\text{cuff.int}}$ for all patients. Error bars represent the standard error of the mean.

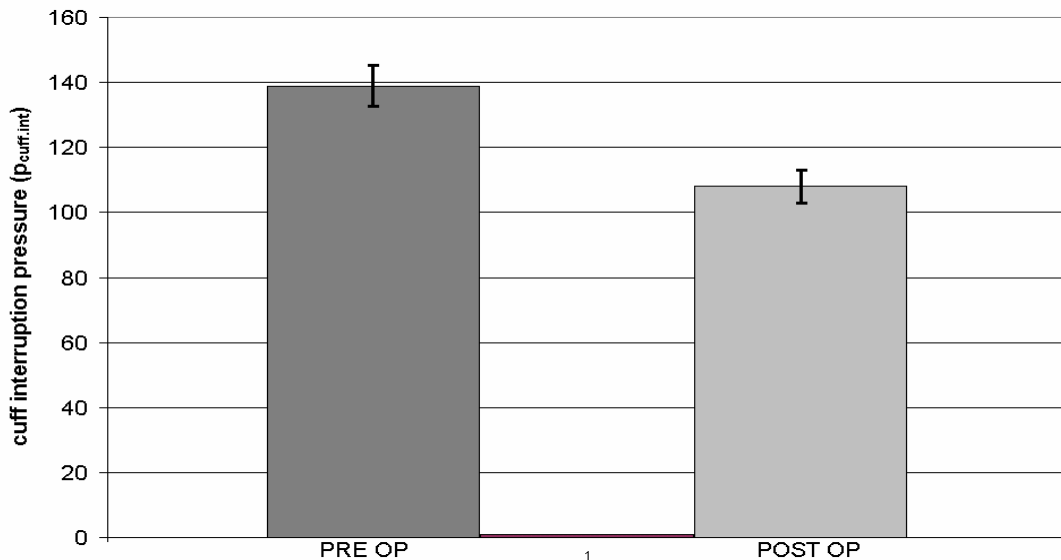


Table 1: Mean (SD) values of $p_{\text{cuff.int}}$ according to obstruction grade as defined by the proposed non-invasive nomogram. P values indicate the results of Students t-test comparing the percentage change between the two categories.

	Obstruction Grade	
	Obstructed	Not Obstructed or Uncertain
Pre-op $p_{\text{cuff.int}}$	151 (32)	130 (37)
Post-op $p_{\text{cuff.int}}$	106 (28)	110 (31)
	p<0.01	

References

- 1 Noninvasive assessment of bladder contractility in men. *J Urol* 2004; 172(4):1394
- 2 Non-invasive bladder pressure: the case for using a modified ICS nomogram. *NeuroUrol Urodyn* 2003;22 (5):367
- 3 Quantification of urethral resistance and bladder function during voiding, with special reference to the effects of prostate size reduction on urethral obstruction due to BPH. *NeuroUrol Urodyn* 1989 1:17-27

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