

## **PREDICTIVE VALUE AND SENSITIVITY TO CHANGE OF NON-INVASIVE PRESSURE FLOW STUDIES**

### **Hypothesis / aims of study**

Transurethral resection of the prostate (TURP) remains the most effective treatment for men suffering from a combination of bothersome lower urinary tract symptoms (LUTS) and reduced urinary flow rate with over 70% achieving good outcome. Previous studies have suggested that the less satisfactory results experienced by up to 30% of patients are due to the presence of undiagnosed detrusor hypocontractility or detrusor overactivity without obstruction (1). It follows that surgical success rates can be improved by performing urodynamic studies to identify men with bladder outlet obstruction (BOO) by plotting simultaneously measured maximum flow rate ( $Q_{max}$ ) and subtracted voiding pressure ( $P_{det.Qmax}$ ) on a nomogram (2). Unfortunately the invasive and relatively costly nature of conventional cystometry prevents its widespread use in the diagnosis of men with LUTS. A novel non-invasive urodynamic test has recently been developed whereby the pressure within a pneumatic penile cuff required to interrupt voiding ( $p_{cuff.int}$ ) gives a valid and reliable estimate of isovolumetric bladder pressure ( $p_{ves.isv}$ ). It has been shown that a plot of  $P_{cuff.int}$  and  $Q_{max}$  on a modified ICS nomogram allows accurate non-invasive diagnosis of BOO (Figure 1; 3).

The aim of the current prospective study was to determine firstly whether pre-operative classification of men using the putative non-invasive nomogram would predict symptomatic outcome from TURP and secondly whether non-invasive urodynamic parameters from the penile cuff test were sensitive to change following TURP.

### **Study design, materials and methods**

Ethical approval and informed written consent were obtained. Men selected for TURP using standard clinical criteria completed an IPSS score and underwent standard uroflowmetry together with a penile cuff test immediately prior to and 4 months subsequent to their surgery. The operating surgeon and the patient were blind to the non-invasive urodynamic findings. Following sample size calculation we plan to investigate 200 men and data from the first 72 men who have completed the study protocol form the basis for this interim analysis.

Individual pre and post-operative values of  $p_{cuff.int}$  and  $Q_{max}$  were read from the non-invasive pressure-flow trace generated by the automated penile cuff device and plotted on the proposed nomogram. A satisfactory outcome from TURP was defined as a greater than 50% decrease in total IPSS. Symptomatic outcome was then related both to the pre-operative non-invasive classification and the individuals change in position on the nomogram following TURP.

### **Results**

A total of 68 (94%) patients provided pre-operative pressure-flow traces acceptable for analysis. Satisfactory symptomatic outcome was achieved for 48 (71%) men. The 27 subjects with BOO diagnosed from the pre-operative non-invasive plot (upper left quadrant on nomogram) showed a success rate of 81% compared to 62% in the 13 men deemed not obstructed pre-operatively. Of the 28 men with equivocal findings 18 (64%) reported a satisfactory outcome. (Figure 2).

Paired pre and post-operative cuff data were obtained for 55 subjects (76%). Comparison of individual nomogram positions showed that all men diagnosed as BOO pre-operatively moved to an unobstructed point on the nomogram following TURP. All men classified as not obstructed pre-operatively remained so following surgery. Most patients in the equivocal groups became unobstructed (14/24, 58%) but three patients from that group moved into the obstructed category with 7 remaining equivocal. (Figure 3).

### **Interpretation of results**

Analysis of interim data from this ongoing prospective study suggests that pre-operative urodynamic diagnostic categorisation using non-invasive parameters measured during the penile cuff test can be used to give improved prediction of good outcome from TURP. The test is simple and reliable for standard clinic use. The test is particularly useful for the 59% of

men who can be confidently diagnosed as being obstructed or unobstructed but some men in the equivocal regions of the nomogram may require further urodynamic assessment for categorisation.

**Concluding message**

These initial data confirm that use of a nomogram plot of non-invasive pressure-flow parameters shows promise for diagnostic categorisation and follow up of men with LUTS.

Figures

Figure 1 The Non-invasive Nomogram

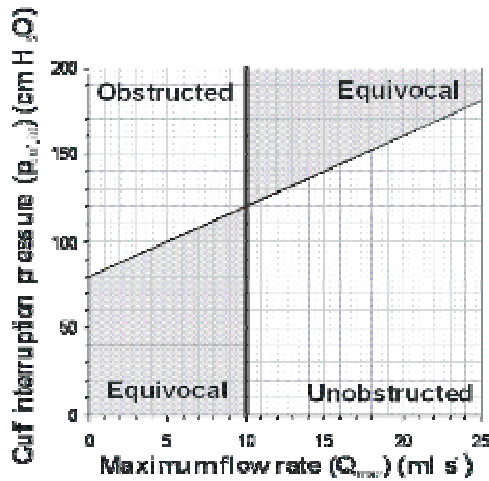


Figure 2 Nomogram position pre-op according to outcome

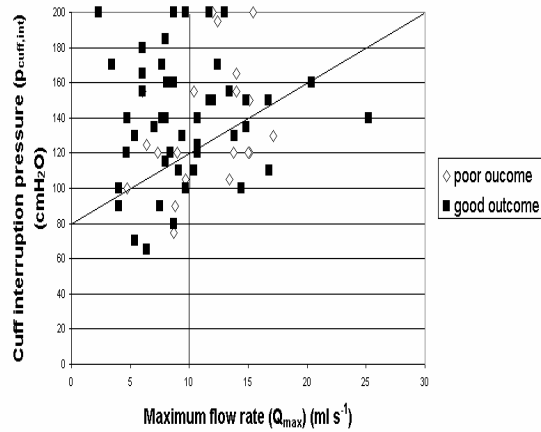
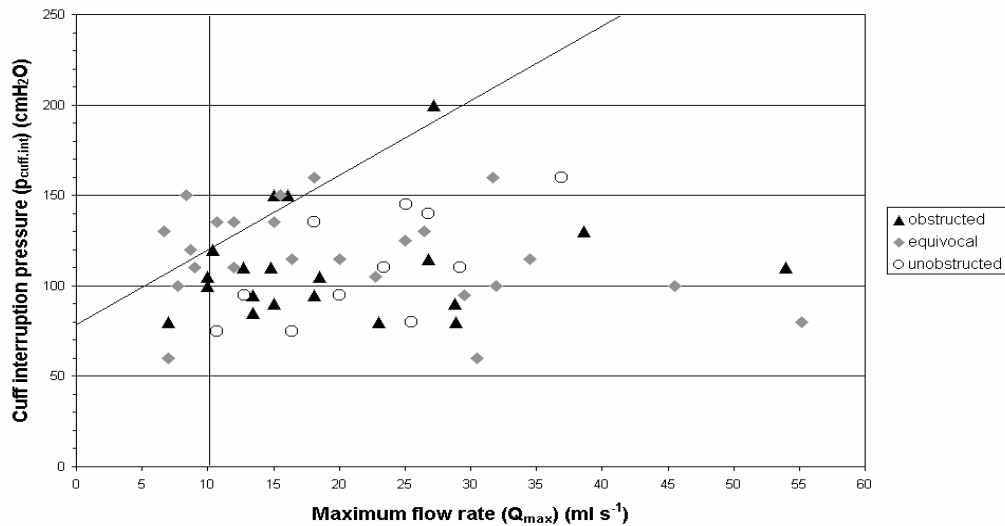


Figure 3 Nomogram position post-op according to pre-operative classification



**References**

- |   |   |                                 |
|---|---|---------------------------------|
| 1 | Outcome of Elective Prostatectomy   | BMJ 1989;299:762-7              |
| 2 | The Results of Prostatectomy  | J Urol 1979;121:640-2           |
| 3 | Non-Invasive Bladder Pressure:<br>the case for using a modified ICS nomogram. | Neurourol Urodyn 2003;22(5):367 |

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