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RELIABILITY OF PEAK FLOW RATE OBTAINED FROM A VOIDING CYCLE INTERRUPTED BY INFLATION OF A PENILE CUFF

Hypothesis / aims of study

A technique has been developed for estimating bladder pressure and diagnosing bladder outlet obstruction non-invasively using inflation of a penile cuff to interrupt flow [1]. The principle is similar to that used for non-invasive blood pressure measurement. At intervals during the voiding cycle the cuff is inflated to interrupt flow and then rapidly deflated, allowing flow to resume. A measurement of peak flow rate (Qmax) for the voiding cycle can still be obtained, though it is important to ignore the brief surges in flow immediately following deflation of the cuff, as illustrated in Figure 1. Our hypothesis is that Qmax measured during the interrupted voiding cycle is a representative estimate for the individual. Our aim was to test this hypothesis by comparing Qmax obtained from both interrupted and non-interrupted flow, recorded during a single visit.

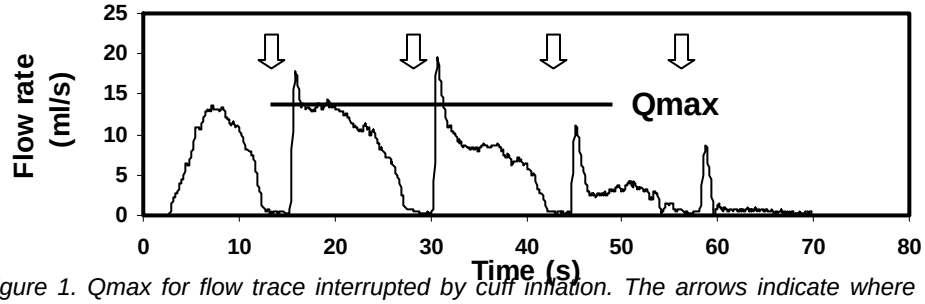

Figure 1. Qmax for flow trace interrupted by cuff inflation. The arrows indicate where flow has been interrupted by inflation of the penile cuff.

Study design, materials and methods

We recruited consecutive men referred for urodynamics from a prostate assessment clinic for further assessment of LUTS. In a single visit we first performed a conventional pressure flow study (PFS) and a PFS with a simultaneous cuff inflation test, in a randomised order. PFS were performed according to ICS good urodynamic practice. A 6F double lumen bladder catheter (Mediplus Ltd) was used for recording and filling, at 50 ml/min, with the patient standing. After refilling again, the bladder line was removed and a second cuff inflation test was performed.

We measured Qmax from the cuff test alone (*Qmax.cuff*) and Qmax from the cuff test with simultaneous PFS (*Qmax.pfs+cuff*). We then compared these with Qmax measured from the conventional PFS study (*Qmax.pfs*) using the method of Bland and Altman [2].

Results

Data were obtained from 148 men and the results are presented as XY scattergrams in Figures 2 and 3 with a summary of the Bland Altman statistics in Table 1.

Interpretation of results

Qmax.cuff and *Qmax.pfs+cuff* both demonstrate good agreement with *Qmax.pfs* recorded during the conventional pressure flow study (Figures 2 and 3).

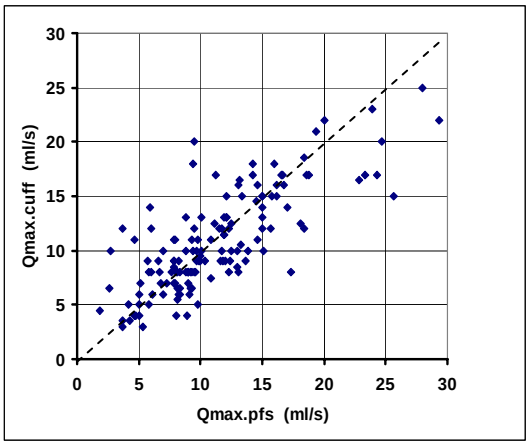

Figure 2. Qmax.cuff v Qmax.pfs

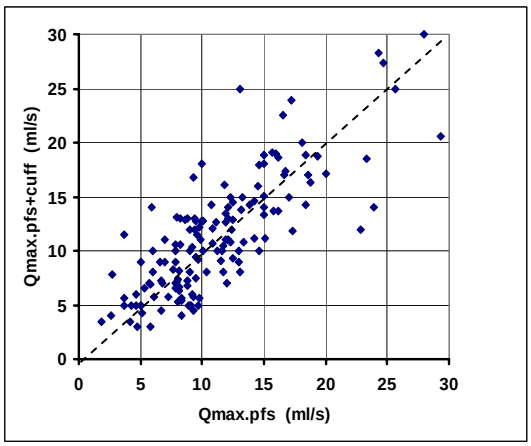

Figure 3. Qmax.pfs+cuff v Qmax.pfs

The Bland Altman statistics for these data are summarised in Table 1.

Table 1.	Mean difference (ml/s)	SD of difference (ml/s)
Qmax.cuff v *Qmax.pfs*	-0.4	3.3
Qmax.pfs+cuff v *Qmax.pfs*	0.1	3.4

The mean differences are not statistically significantly different from zero (95% confidence intervals -0.93 to +0.13 ml/s; and -0.54 to +0.56 ml/s respectively) suggesting measurement of Qmax during a cuff test has not introduced a systematic bias. The standard deviation of the differences is close to that which would be predicted from published data for Qmax measured in repeated PFS [3]. This suggests the measurement of Qmax during a cuff inflation test does not introduce additional variability above what would normally be expected.

Concluding message

This study has confirmed the reliability of measurement of Qmax from the interrupted flow recording obtained during the cuff inflation test, in the controlled surroundings of the urodynamic clinic. The results suggests a single voiding cycle can provide a reliable estimate of Qmax in addition to a non-invasive estimate of bladder pressure which may be useful when applying the cuff inflation test in the prostate assessment clinic. The results further validate the use of Qmax during a cuff test on the proposed non-invasive cuff-interruption pressure – flow nomogram [1].

[1] J Urol 2005; 174: 1323 – 1326.
[2] Lancet 1986; i: 307 – 310.
[3] Neurourol Urodynam 2000; 19: 637 – 656.

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