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INTER-OBSERVER AGREEMENT IN THE INTERPRETATION OF PRESSURE-FLOW CYSTOMETRY

Aims of Study

Lower urinary tract symptoms are common in the male population, and can often be attributed to bladder outflow obstruction. Cystometric pressure-flow studies are useful in the investigation of symptoms and essential for urodynamic diagnosis.
The ICS recommend that maximum flow (Q_{max}), detrusor pressure at maximum flow ($p_{detQmax}$) and the derived Abrams-Griffiths (AG) number are appropriate objective parameters to diagnose obstruction (1). However, Q_{max}, $p_{detQmax}$ and (by inference) the AG number are inevitably subject to observer error in their measurement.
The aim of this study was to establish the agreement between expert observers in the assessment of Q_{max}, $p_{detQmax}$ and the AG number from cystometric data.

Methods

Six asymptomatic male subjects and thirty-six consecutive male patients recruited from a larger clinical study of bladder outflow obstruction were studied (Table 1).

Parameter	Overall mean ± SD	Overall range
Age (years)	62.4 ± 14.4	20 to 88
Body mass index (kg m^{-2})	26.5 ± 4.7	19.4 to 38.6

Table 1: Morphometric data for the subjects studied.

Each subject underwent voiding cystometry using a standard technique, according to the ICS guidelines for good urodynamic practice (**2**). The bladder was filled to cystometric capacity, then the subject was asked to void as normal. Flow rate (Q), vesical pressure (p_{ves}), abdominal pressure (p_{abd}) and (by electronic subtraction) p_{det} were recorded continuously during the entire study.

The studies were analysed independently and in random order by 3 experienced observers; each study was assessed as follows:

- The data (p_{ves}, p_{abd}, p_{det} and Q) were displayed on computer screen;
- The observer recorded Q_{max} and $p_{detQmax}$ according to the ICS standard;
- AG number was calculated as follows: AG = $p_{detQmax} – 2 \times Q_{max}$.
- For Q_{max}, $p_{detQmax}$ and AG number separately, the error was quantified as the standard deviation (SD) of the measurements between the three observers.

For each parameter the overall error was quantified as the overall SD of the measurements across all subjects.

Results

Two patients were unable to void, leaving forty data sets for analysis (table 2):

Parameter	Overall mean ± SD	Overall range	Overall SD inter-observer error
Q_{max} (ml/s)	11.1± 4.5	3.0 to 22.1	0.6
$p_{detQmax}$ (cm H_2O)	55.1± 23.9	22 to 143	4.5
AG number	33.0 ± 27.6	1.6 to 134.4	4.6

Table 2: Summary statistics for the cystometric parameters measured.

The observer errors in Q_{max} and $p_{detQmax}$ (figure 1) are considerably smaller than those due to test-retest variation, which are typically 1-2 ml s^{-1} and 10-15 cm H_2O respectively (**3, 4**).

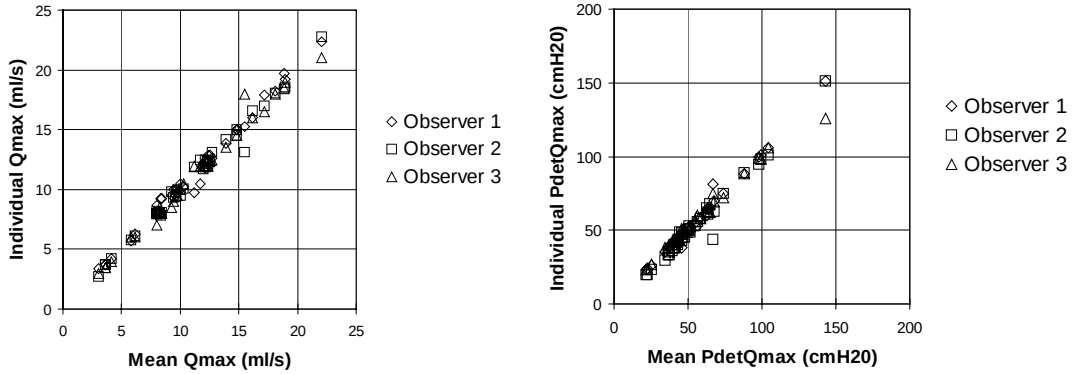

Figure 1: Agreement for (**left**) Q_{max}, and (**right**) $p_{vesQmax}$. For each subject we plot three individual estimates of the value (Y-axis), versus the mean of the three estimates (X-axis).

Obstruction is traditionally assessed using the provisional ICS nomogram, and the derived AG number gives exactly equivalent information.

- If the AG number is < 20, the subject is classified *unobstructed* by the nomogram;
- If the AG number is 20 to 40, the subject is classified *equivocal* by the nomogram;
- If the AG number is > 40, the subject is classified *obstructed* by the nomogram.

Using the data in figure 2, for only six subjects was there any disagreement between the three observers as to the subject's classification. In no case was a subject rated *obstructed* by one observer but *unobstructed* by another.

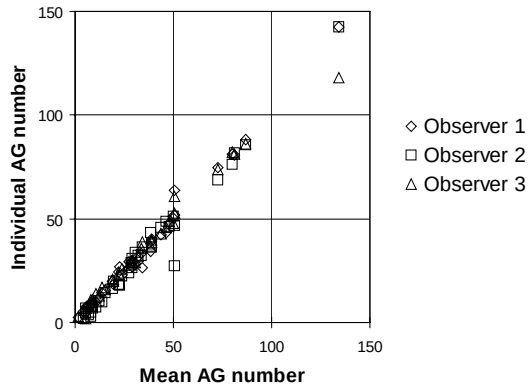

Figure 2: Agreement for the AG number. For each subject we plot three individual estimates of the AG number (Y-axis), versus the mean of the three estimates (X-axis).

Conclusions

Although test-retest variability has been the subject of a number of studies which suggest significant differences that may result in re-classification of the subject, no studies to date have addressed inter-observer variation. The data from this study suggest that (where well-trained observers are interpreting good-quality urodynamic data) inter-observer variation for parameters obtained during conventional cystometry is minimal. Thereafter, classification using the AG number is highly consistent between observers. Given the substantial test-retest variability, we conclude that there is no need for multiple observers in the interpretation of pressure-flow studies for assessment of bladder outflow obstruction.

References

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