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INTER-OBSERVER AGREEMENT IN THE ESTIMATION OF BLADDER PRESSURE USING A PENILE CUFF.

Aims of Study

We previously reported a non-invasive method of estimating bladder pressure during voiding by inflating a penile cuff to measure the pressure at which flow is interrupted ($p_{cuff,int}$) (1). The cuff pressure is then released allowing flow to resume and the cycle is repeated until voiding is complete, giving typically 2 or more inflation cycles per void. In this study we determine the agreement between experienced observers in deciding which inflation cycles are suitable for measurement, and in their subsequent estimates of $p_{cuff,int}$.

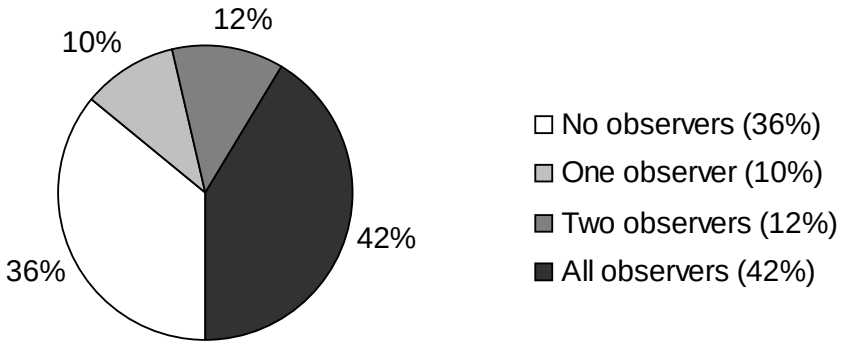
Methods

We analysed data from the first 42 patients recruited for a larger clinical study of the cuff measurement. Each subject visited the clinic on up to 3 occasions, providing up to 5 voids, to give a total of 142 voids. Each void included from 1 to 8 cuff inflation cycles, providing a total of 487 cycles for analysis. For each inflation cycle we plotted the graph of flow rate versus applied cuff pressure that we routinely use to estimate the cuff pressure at which flow stops. Each of 3 experienced observers analysed all cuff inflation cycles, as follows.

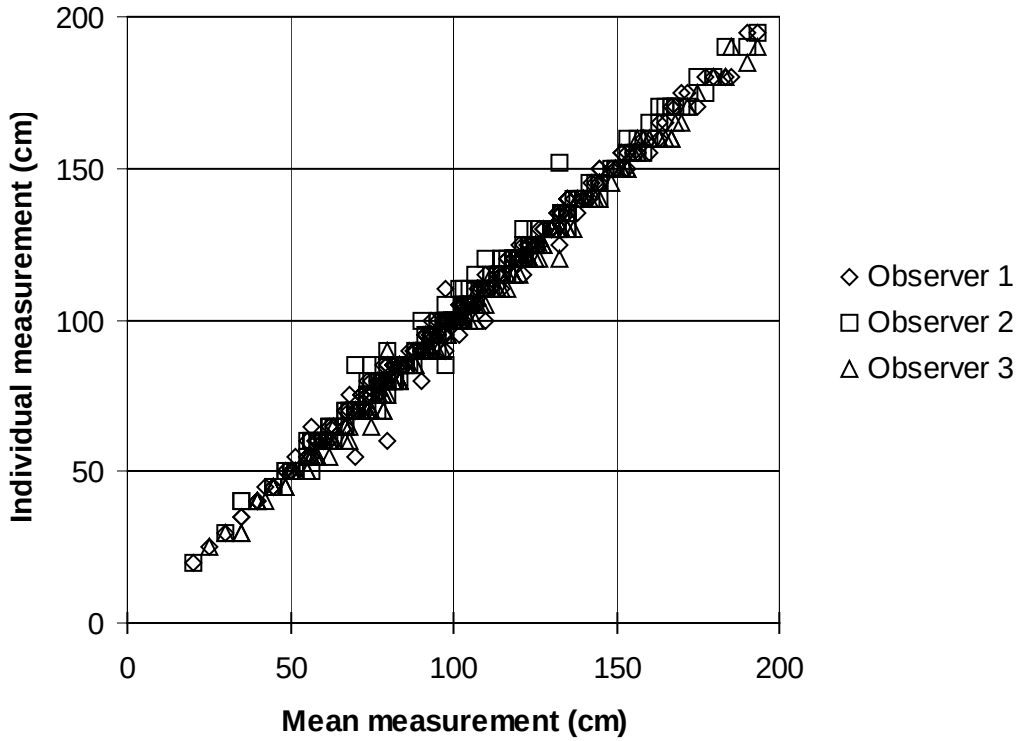
Each observer indicated whether, in their opinion, the inflation cycle should be measured according to a set of agreed exclusion criteria. These criteria included no recovery of flow after cuff release, erratic flow or ambiguity about the moment of interruption. For cycles deemed suitable for analysis, the observer estimated the cuff pressure at which flow was interrupted (to the nearest 5 cm H_20). Each observer performed their analysis blind, independently and in random order. Inflation cycles measured by less than two observers were not used further. For each inflation cycle measured by 2 or 3 observers, the mean and standard deviation (SD) of $p_{cuff,int}$ were calculated.

Results

For 38 of the 42 patients, one or more inflations was judged satisfactory by all observers. The pie chart shows the proportion of inflations judged suitable for analysis by none, one, two and all of the observers.



For the inflations analysed by all observers (n=202), the mean estimated pressures were: 103.8, 103.9 and 100.7 cm H_20. 54% of inflations (n=261) were analysed by at least two of the three observers, and for these the overall mean of the SDs calculated for each inflation cycle was 2.93 cm H_20 (2.88 cm H_20 for 2 observers only; 2.95 cm H_20 for 3 only). The graph shows the individual estimates of $p_{cuff,int}$ (y-axis) versus the mean of these values (x-axis), our best estimate of its true value. Most of the inflation cycles excluded by all observers were at the end of voiding when flow did not recover.



Conclusions

The aim of this study was to quantify inter-observer agreement in deciding, on the basis of defined exclusion criteria, which inflation cycles were suitable for measurement and how well the estimated $p_{cuff,int}$ agreed.

There is good agreement as to which inflations should be analysed; for only 22% of all inflations was there any disagreement. Where two or more observers analyse an inflation, inter-observer agreement is excellent, with an SD error of typically 2.9 cm H_20.

References

1. J Urol 2002; 167: 1344-47.