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DIAGNOSIS OF OBSTRUCTION – PLAYING THE ODDS

Hypothesis / aims of study

There has been much written on the diagnosis of bladder outlet obstruction (BOO) from flow rate alone. In particular, many authors advocate the use of cutoffs (for example, Q_{max} < 10 ml/s) below which obstruction is presumed [1], but this may be misleading. The assumption that obstruction is a dichotomous state is not supported by large series of data [1, 2, 3] showing great overlap in flow rates between obstructed and unobstructed men. Since BPH is a disease that develops over time, it seems logical that an equivocal flow rate may correspond to a midway stage in disease progression.

The inability to diagnose BOO from flow rate alone suggests that the best use of flow rate measurement is to give a probability of obstruction. Further, we propose this can be done from simple population statistics. The aims of this study were:

- To estimate the probability of obstruction for any given Q_{max} using population statistics
- To compare our model with data recorded in a clinical population

Study design, materials and methods

In order to estimate the probability of obstruction, we took the Q_{max} distributions for large groups of *obstructed* (9.5 ± 3.8 ml/s) and *unobstructed* (12.9 ± 5.3 ml/s) men from the literature [3]. Using a simple Gaussian model we calculated the probability of belonging to each group, and hence the probability of obstruction, at flow rates from 0 to 20 ml/s.

We studied 87 men being investigated for lower urinary tract symptoms. After a conventional free flow measurement, each underwent voiding cystometry, and was classified as *obstructed* (AG>20, n=48) or *not obstructed* (n=39) according to the provisional ICS nomogram. Using the ICS classification as gold standard, we assessed the probability of obstruction in each of seven flow rate bands: 0-5 ml/s; 5-7; 7-9; 9-11; 11-14; 14-18; 18+ ml/s. These bands were chosen so as to give approximately equal numbers of men in each.

Results

The predicted and observed probabilities of obstruction are shown in figure 1.

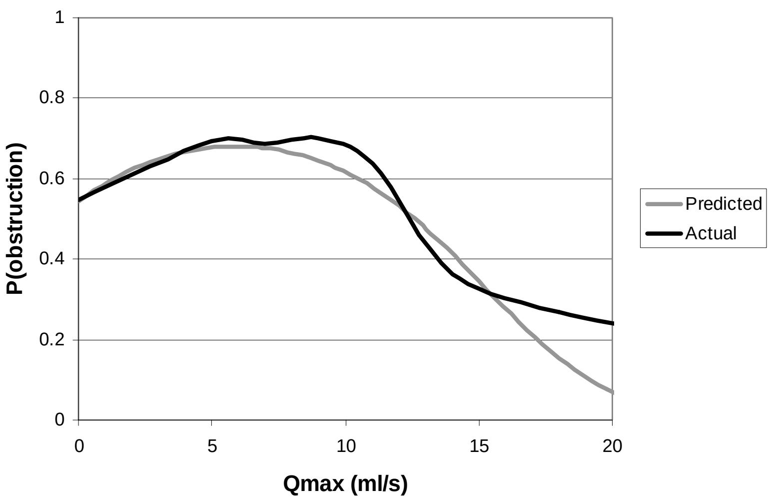

Figure 1 The predicted probability of obstruction, and the actual observed proportion of obstruction in 92 men attending a LUTS clinic. The predicted probabilities are calculated from population statistics using a Gaussian model.

Interpretation of results

There is a remarkably close correspondence between the predicted and observed probabilities of obstruction. In particular, the model predicts a behaviour that has not been well-reported; the probability of obstruction actually decreases at low flow rates. This was indeed the observed behaviour in our study, and comes about because the spread of flow rates in the *non-obstructed* group is greater than that in the *obstructed* group.

The highest probability of obstruction occurs at flow rates of 5-7 ml/s, but is never beyond 70%. This probably reflects the best possible outcome from selection based on flow-rate criteria alone.

Finally, it is also of note that above 10 ml/s, the predicted and actual probabilities of obstruction both fall markedly. If a pragmatic cutoff was being used, this seems a reasonable value to choose.

Concluding message

Flow rate measurements are considered an essential tool in the prostate assessment clinic, but we believe it is not possible to predict obstruction using flow rate alone. To make best use of flow rate measurements, we advocate using a probability-based model that recognises the fundamental limitations of the measurement.

References

[1] British Journal of Urology 1996; 77: 813-18.
[2] British Journal of Urology 1998; 82: 619-23.
[3] J Urol 1996; 155: 1649-1654.

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