462

Huang Foen Chung J W N C[1], Van Mastrigt R[1]
1. Erasmus MC, Rotterdam, The Netherlands

THE RELATIONSHIP BETWEEN URETHRAL RESISTANCE ESTIMATED BY NON-INVASIVE URODYNAMICS AND THREE DAY FREQUENCY VOLUME CHARTS.

Hypothesis / aims of study

In patients with an anamnesis of lower urinary tract symptoms (LUTS), the completion of a frequency volume chart is, among others, one of the standard examinations in urological practice. Another one is the evaluation of the grade of bladder outlet obstruction by a urodynamic pressure flow study. To our knowledge, the relationship between the parameters of a frequency volume chart and a measure of infravesical obstruction has not been studied before. Presently, we conduct a longitudinal study [1] to non-invasively measure changes in bladder contractility secondary to benign prostatic enlargement in subjects. A frequency volume chart was also included. Here, we evaluate the relationships between these two diagnostic tools and the IPSS.

Study design, materials and methods

Male subjects of age 38-77 were invited by their general practitioners to take part in the longitudinal study. Inclusion criteria were: written informed consent and ability to void in the vertical position. Exclusion criteria were: diabetes mellitus; certain conditions, previous surgery or medication, of the cerebrum, the heart, kidney, bladder and / or prostate. Dormant LUTS were not an exclusion criterion. The subjects were requested to complete a frequency voiding diary of (at least) three days, including the bed time and wake up time. The investigation in the hospital started with a free uroflowmetry to measure the maximum flowrate, Q_{max}. Subjects with a flowrate above 5.4 ml/s underwent at least one measurement attempt with the condom catheter method [1]. The maximum condom pressure ($p_{cond.max}$) measured with this method reflected the isovolumetric bladder pressure. Additionally, a international prostate symptom score (IPSS) questionnaire was completed.
The urethral resistance URR was calculated as $p_{cond.max}$ -5.8*Q_{max}-36.4 [2]. A negative result of the formula was classified as a low URR whereas a positive result as a high URR. From the diaries we calculated: the mean numbers of voids at day and at night, and the mean time between two voidings at day and at night. These parameters were correlated with the IPSS and the urethral resistance. The Spearman's rho test was used as study statistics. A $p<0.001$ was considered statistically significant.

Results

In 1021 (96%) of 1073 eligible subjects, the IPSS was completed, and at least one condom pressure measurement was successfully done. In 979 (96%) of these 1021 subjects, a correct frequency voiding diary of three days was completed as well. Descriptives of the frequency voiding charts are given in table I. According to the formula applied, 73% of the subjects had a low urethral resistance (URR) whereas 27% had a high URR. The mean numbers of voidings at day and at night, and the mean time between two voidings at day and at night were correlated with the IPSS and the URR respectively. Table II gives the Spearman's correlation coefficients and the corresponding p values. Figure I is a scatter plot of one frequency voiding chart parameter (mean day voids) and the URR.

Table I

	N	Minimum	Maximum	Mean	Std. Dev.
Voids (n=number)	986	7	49	20	6
Maxvol (ml)	986	125	1400	504	184
Medianvol (ml)	986	50	590	239	85
Meandayvoids (n)	979	1	19	5.75	1.83
Meannightvoids (n)	979	0	4	.50	.70
Meantime 2voids* (min)	973	52	529	197	68
Meantime 2voids**(min)	973	94	621	267	79

*Mean time between two voids at day time, ** at night time

URR	Mean number day voids	Mean number night voids	Mean time between 2 voids at day	Mean time between 2 voids at night
N	979	979	973	973
Spearman's rho	0.20	0.15	-0.20	-0.16
p	<0.001	<0.001	<0.001	<0.001
IPSS				
Spearman's rho	0.35	0.28	-0.38	-0.30
p	<0.001	<0.001	<0.001	<0.001

Table II

Interpretation of results

A successful condom pressure measurement was interpreted as one without- or in some cases minimal terminal - leakage of urine. The duration of the diaries (three days) was chosen as recommended [3] and feasible to the subjects. The finding of a high urethral resistance in 27% of these subjects indicated the latency of LUTS in this study group recruited from the general population. The additional recording of the bed time and wake up time made it possible to calculate the mean numbers of voidings at day and at night, and the mean time between two voidings at day and at night. As these four parameters are related to the symptoms of bladder outlet or infravesical obstruction, they were correlated with the urethral resistance (URR). Table II shows the weak correlations found between these parameters from the voiding diaries and the URR in this longitudinal study. The equal but inversely proportional correlation between the mean numbers of voids and the mean time between two voids is obvious. The moderate correlations among the voiding diaries and the IPSS illustrate the agreement between those, and the reliability of the voiding charts.

Figure I

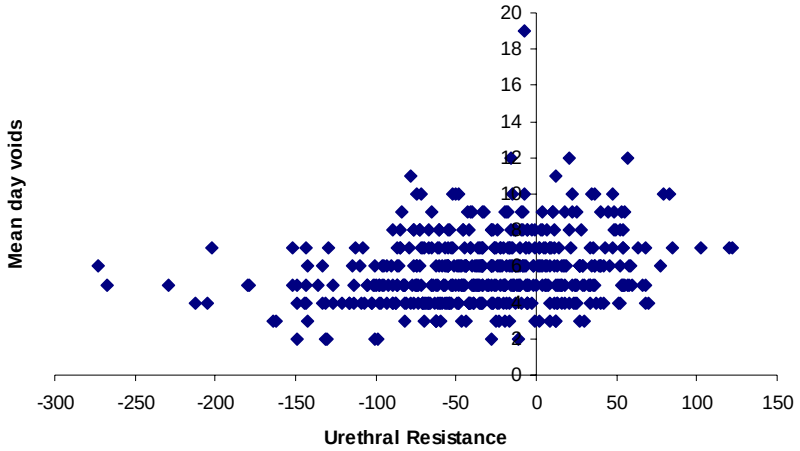

Figure I illustrates the relationship of the mean day voids and the URR. A high urethral resistance defines infravesical obstruction. Pathologically, the causes may differ from benign prostate enlargement, bladder neck sclerose to urethral stricture or stenosis. On the other hand, other urological, psychological or even physical and social factors may interfere with the (non)expression of LUTS when recorded by a diary.

Concluding message

In this study, a statistically significant, but weak correlation was found. LUTS as quantified by frequency voiding diary parameters do not seem to correlate with the urethral resistance as estimated by non-invasive urodynamics. Generally, bladder outlet or infravesical obstruction may be a contributing but not the only underlying condition for LUTS. Many other factors may determine the 'severity' of LUTS as witnessed by a voiding diary.

References
[1] Applicability and reproducibility of the condom catheter method for measuring the isovolumetric bladder pressure. Urology 2004: 63(1): 56-60. [2] Development of a strategy to non-invasively classify bladder outlet obstruction in male patients with LUTS; Neurourol Urodyn 2002: 21(2):117-125. [3] Voiding and incontinence frequencies: Variability of diary data and required diary length. Neurourol and Urodyn 2002: 21: 204-209.

FUNDING: Acknowledgements: This study was supported by the Dutch Kidney Foundation (PC85), and the foundations