

DIFFERENCES IN IPSS AND FREQUENCY VOIDING CHARTS IN MEN WITH LOW VERSUS HIGH URETHRAL RESISTANCE ESTIMATED BY NON-INVASIVE URODYNAMICS.

Hypothesis / aims of study

In a longitudinal study we non-invasively evaluated the urethral resistance in voluntary male subjects [1]. A frequency voiding chart and an international prostate symptom score (IPSS) were completed too. Based on non-invasive urodynamics, this population was divided in two subgroups with a low or with a high urethral resistance. We explored differences in the IPSS, and the frequency voiding charts between these groups.

Study design, materials and methods

Healthy male subjects aged 38-77 have been investigated from November 15, 2001 to December 31, 2003. Inclusion criteria were: written informed consent and ability to void standing. Exclusion criteria were: diabetes mellitus and conditions such as heartfailure and Parkinsonism, previous surgery or medication of the cerebrum, the heart, kidney, bladder and / or prostate, and the use of anticoagulants. Dormant lower urinary tract symptoms (LUTS) were not a study criterion. In each subject the free flowrate was assessed with a Dantec[®] rotating disc flowmeter. 1073 Subjects with a maximum flowrate (Q_{max}) above 5.4 ml/s underwent a bladder pressure measurement by means of the condom catheter method [1]. The maximum condom pressure ($P_{cond.max}$) measured reflected the isovolumetric bladder pressure. The urethral resistance (URR) was calculated using the formula: $P_{cond.max} - 5.8 * Q_{max} - 36.4$ [2]. Positive values were classified as high and negative values as low urethral resistance. In between the measurements, the subjects completed the international prostate symptom score (IPSS). Also, all subjects were requested to complete a frequency voiding chart of (at least) three consecutive days, including the bed and wake up times. By linear interpolation of the bladder volume between the voidings, the mean urine production per hour was calculated both during the awake and the sleep period [3]. Mann-Whitney-U and Spearman's rho tests were the study statistics used. $P < 0.001$ was considered statistically significant.

Results

A successful bladder pressure measurement was done in 1020 (95%) of the 1073 subjects. 935 Subjects (92% of 1020) properly completed the IPSS and the frequency voiding chart as well. According to the formula 687 of these men had a low urethral resistance (URR) (open circles) whereas 248 (24%) had a high URR, closed circles in figure 1. Table 1 shows statistics of the two subgroups. Differences in age, IPSS, mean number of voidings in the awake period, minimum, maximum and mean voided volumes, and mean day and mean night urine production per hour are included.

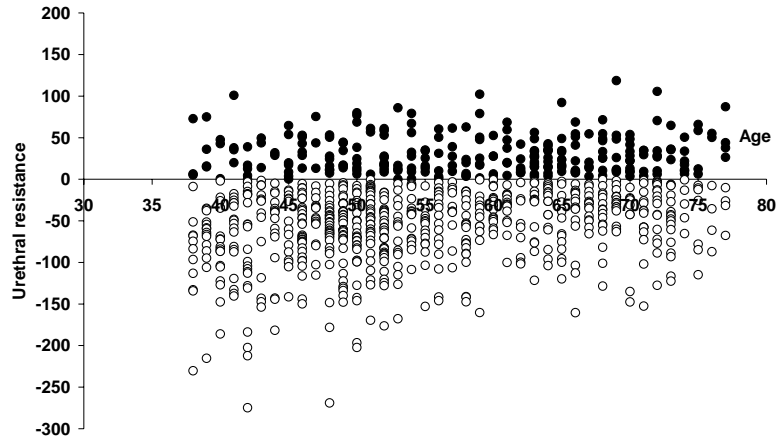


Figure 1

In the last row of the table the p-values of the Mann-Whitney-U-test for comparing both groups are given.

Interpretation of results

The possibility of polyuria by concomitant disease or drug use was excluded by the study criteria. The finding of a high urethral resistance in 24% of the subjects revealed the latent LUTS in this study group recruited from the general population. Except for the minimum voided volume, all parameters studied were statistically significantly different between the two subgroups. The mean age (58 ± 10 versus 55 ± 10) and mean IPSS (7.2 ± 5.2 versus 5.4 ± 4.3) were significantly higher in the high URR than in the low URR group. The parameters derived from the frequency voiding charts show the same trend in terms of bother. Statistics of the mean number of daytime voids and the minimum and maximum voided volumes show the higher incidence of irritative symptoms, such as frequency and smaller bladder capacity, in men with high URR. A negligible difference of the incidence of nocturia (>2 voids per night), 26 men (3.8%) in the low versus 12 men (4.8%) in the high URR group was found. Conform the normal circadian variation, the mean and range (5%-95%) of the mean day production of urine per hour was greater than that at night in both groups. As a result of not recording the bed and wake up times in some cases, the number of observations was slightly smaller (see table) for these parameters. The mean urine production values were independent of age. Spearman's correlation coefficients were -0.28, $p=0.664$ and 0.072 , $p=0.261$ respectively.

	Age (yr)	IPSS	Mean day voids	Min voided volume (ml)	Max voided volume (ml)	Mean voided volume (ml)	Mean day prod (ml/h)	Mean Night prod (ml/h)
Low Resistance n= 687 →							n=677 →	
Mean	55	5.4	5.6	105	523	268	96	58
Stdev	10	4.3	1.9	58	182	88	51	36
% 5	40	1.0	3.0	27	277	153	41	21
% 95	73	14.0	9.0	200	900	419	208	138
High Resistance n= 248 →							n=246 →	
Mean	58	7.2	6.1	96	449	232	92	61
Stdev	10	5.2	1.9	49	169	75	46	57
% 5	41	1.0	4.0	25	215	128	39	18
% 95	74	18.0	10.0	168	750	373	181	141
P-value*	<0.001	<0.001	<0.001	0.127	<0.001	<0.001	<0.001	<0.001

Table 1. *P-values for Mann-Whitney-U test.

Concluding message

Statistically significant but rather small differences in the IPSS and the frequency voiding charts were found between male subjects with low and high urethral resistance as established by non-invasive urodynamics. Clinically, a high urethral resistance may be a contributing but not the only underlying determinant of LUTS. Additionally, it did not seem to alter the normal circadian variation in urine production per hour.

References

- [1] Applicability and reproducibility of condom catheter method for measuring isovolumetric bladder pressure. *Urology* 63 : 56-60 (2004).
- [2] Development of a non-invasive strategy to classify bladder outlet obstruction in male patients with LUTS. *Neurourol Urodyn* 21 : 117-25 (2002)
- [3] Analysis of voided urine volumes measured using a small electronic pocket balance. *Sc J Urol Nephrol* 30 : 257-263 (1996)