

IS IT POSSIBLE TO DIAGNOSE DETRUSOR UNDERACTIVITY IN WOMEN OR YOUNG MEN WITHOUT BLADDER OUTLET OBSTRUCTION?

Hypothesis / aims of study:

Detrusor underactivity (DU) may be a cause of lower urinary tract dysfunction and symptoms (LUTD-S). The ICS definition of DU is descriptive, without urodynamic (UDI) reference values or clinical limits. Slow and ineffective voiding, with post void residual (PVR), is relevant in the definition of DU. Diverse methods to quantify urodynamic pressure flow of a voiding exist.

In elderly male patients the cause of ineffective voiding and PVR will very prevalently be the enlarged prostate and its consequence: bladder outlet obstruction (BOO). BOO 'challenges' the detrusor to deliver more work; the detrusor compensates for –the gradually over years- developing BOO. Some men with BOO are less well able to compensate, for yet unknown reasons, and have relative DU which is observed almost 20 years ago.^{1,2}

Without BOO however, the detrusor contracts at higher emptying velocity; = higher flow rate and is, because of the lack of outlet resistance, sometimes unable to generate pressure. Nevertheless also in the absence of BOO the voiding of patients with LUTS may be –chronically- ineffective and DU may be the cause. To establish more insight in the analysis of DU in association with LUTD-S in patients without (a high à priori prevalence of) BOO we analysed symptomatic young men without prostate enlargement and women with (not neurogenic) LUTD-S.

Study design, materials and methods:

Pressure flows of ICS-standard external pressure cystometries of 736 women, mean age 57,9 years (range 17-99) were analysed. Voiding was allowed, comfortably seated, in privacy, after filling until a strong but not uncomfortable desire to void. Subjectively very unrepresentative voidings; 'situational dysfunction', were not included. Voidings within the most natural voiding range, 100-800mL, were included (regardless the PVR volume). Likewise, 132 young men, mean age 34,6 (18-45) were included. These men had no evidence of BPH on clinical examination and prostate ultrasound (<25gm) and were allowed to void in standing or seated position according to preference (standing in ±75%). ICS-BOOI and ICS-BCI were used to categorize for BOO or DU.

Results:

280 (38,1%) of the women and 26 (19,7%) of the younger men had DU. Fifty (6,8%) women and 33 (25%) men of the set of patients had urodynamic evidence of BOO. The table shows for the men and the women the average age, and the free flow parameters maximum and mean flow rate, volume voided, flow time and voiding time. Furthermore time to maximum flow and flow acceleration as well as the time to the beginning of flow (delay). Residual volume was measured directly after uroflowmetry with suprapubic ultrasound. Flow efficiency was the percentage of bladder content (=voided volume + PVR) voided. ANOVA p-values of DU versus normal contraction and BOO versus no -BOO are listed for all parameters.

Interpretation of results:

(See table) Women with DU were older, had lower maximum flowrate and their voidings were slower although less reliably lesser effective, or with more PVR. The flow parameters differences were significant between the DU and the normal (or strong) contracting voiders however hardly discriminating between the normal and the obstructed.

Symptomatic younger men with LUTD-S had a certain prevalence of BOO, despite no evidence of prostate enlargement; Usually bladderneck hypertrophy is diagnosed in those men. Flowmetry has however been an indicator for DU in those men, when prolonged slow voiding was observed. In younger men the predicting value of flowrate towards DU versus BOO was however very modest. Neither residual volume, nor flow effectiveness has been optimally discriminating.

Women	Age	Q _{max}	Q _{mean}	Volume	Flow time	Void time	Time Q _{max}	Flow accel	Flow delay	Flow PVR	Flow eff.	
DU	N	280	181	179	181	180	180	179	167	167	73	72
	Mean	62,6	14,7	6,9	217,6	33,3	53,5	17,3	2,9	31,9	72,7	78,2
	sd	16,3	8,9	4,6	177,8	23,2	56,5	31,7	9,3	28,5	110,7	28,1
Normal or strong	N	456	392	392	393	392	391	392	370	370	121	121
	Mean	55,0	21,8	10,7	232,4	22,7	34,5	10,1	3,8	27,4	33,9	88,9
	sd	17,4	12,0	6,8	171,9	13,9	31,0	15,2	3,6	30,5	66,5	17,4
Total	N	736	573	571	574	572	571	571	537	537	194	193
	Mean	57,9	19,6	9,5	227,7	26,0	40,5	12,4	3,5	28,8	48,5	84,9
	sd	17,4	11,6	6,5	173,8	18,0	41,7	22,0	6,0	29,9	87,7	22,6
Contraction ANOVA		.000	.000	.000	.343	.000	.000	.000	.102	.117	.003	.001

Men <45		Age	Q _{max}	Q _{mesn}	Volume	Flow time	Void time	Time Q _{max}	Flow accel	Flow delay	Flow PVR	Flow eff
DU	N	26	14	14	14	14	14	14	12	12	6	6
	Mean	38,0	11,0	5,7	257,0	45,1	54,0	26,0	0,83	25,4	11,00	97,7
	sd	4,9	4,1	2,4	184,0	22,8	20,7	27,6	,51	15,2	26,944	5,6
Normal or strong	N	106	68	68	68	68	68	68	62	62	28	28
	Mean	33,7	18,0	9,9	241,5	25,4	34,4	10,1	4,8	31,1	26,86	93,7
	sd	6,3	10,1	5,7	188,1	18,5	22,1	11,5	14,6	30,6	74,549	13,9
Total	N	132	82	82	82	82	82	82	74	74	34	34
	Mean	34,62	17,6	9,1	244,2	28,8	37,7	12,8	4,13	30,2	24,06	94,4
	sd	6,297	9,8	5,5	186,4	20,5	23,0	16,4	13,4	28,7	68,518	12,9
Contraction ANOVA		.007	.019	.034	.047	.000	.002	.002	.549	.529	.829	.784

Concluding message

In groups of patients; young men and women, with a relatively low incidence of BOO, uroflow parameters may well indicate the possible existence of (urodynamically confirmable ICS-BCI-) DU. In young men maximum or mean flowrate are discriminating to a lesser extend but voiding and flow time, and time to Q_{max} are prolonged in DU. Post void residual volume seems also of lesser relevance to predict the urodynamic existence of DU. Especially in women uroflowmetry is of good value to 'screen' for the possibility of DU.

References

1. Analysis of maximum detrusor contraction power in relation to bladder emptying in patients with lower urinary tract symptoms and benign prostatic enlargement. J Urol. 1995 Dec;154(6):2137-42.
2. Evaluation of detrusor activity during micturition in patients with benign prostatic enlargement with a clinical nomogram. J Urol. 1996 Aug;156(2 Pt 1):473-8; discussion 478-9.

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