

VIDEOURODYNAMIC STUDIES OF WOMEN WITH VOIDING DYSFUNCTION

Hypothesis / aims of study

Clinical symptoms are not reliable in the diagnosis of lower urinary tract dysfunction in women. The aim of this study is to report the videourodynamic findings of women with symptoms of voiding dysfunction, and to find out any conventional urodynamic parameters that can be used as screening tools for initial differential diagnosis.

Study design, materials and methods

The medical records of women with dominant symptoms of voiding dysfunction, who underwent videourodynamic studies between Oct 1997 and Jan 2015 at the Department of Urology of a tertiary referral center, were retrospectively reviewed.

Results

A total of 1,914 women were analyzed. Of them, 810(42.3%) were diagnosed as having bladder outlet obstruction (BOO), 1,048(54.8%) bladder dysfunction (BD) and 56(2.9%) normal tracing (Table 1). BOO includes functional and anatomic BOOs. Anatomic BOO included urethral stricture (n=30) and cystocele (n=19). The most common functional BOOs were poor relaxation of external sphincter (PRES, n=336, 17.6%) and dysfunctional voiding (DV, n=325, 17.0%) (Table 2, Fig.1). The most common BDs were detrusor underactivity (n=337, 17.6%), bladder oversensitivity (n=325, 17.0%) and detrusor hyperactivity with impaired contractile function (n=231, 12.1%). The uroflowmetry parameters of BOO seemed not different to that of BD (Tables 1, 3). Based on the receiver operating characteristic (ROC) analysis, the following optimum cutoff values were determined: (1) PdetQmax=30 cmH₂O for differentiating BOO from BD and normal tracing, with the ROC area being 0.78 (95% CI=0.76 to 0.80; sensitivity=54.6%, specificity=91.8%); (2) AG number (i.e., PdetQmax - 2*Qmax)=30 for differentiating anatomic BOO from functional BOO, with the ROC area being 0.66 (95% CI=0.58 to 0.74; sensitivity=46.9%, specificity=76.5%); (3) PVR=200 mL, for differentiating bladder neck dysfunction from DV and PRES, with the ROC area being 0.69 (95% CI=0.63 to 0.74; sensitivity=52.0%, specificity=74.1%); and (4) PdetQmax=30 cmH₂O for differentiating DV from PRES, with the ROC area being 0.93 (95% CI=0.91 to 0.95; sensitivity=87.7%, specificity=83.0%).

Interpretation of results

Uroflowmetry cannot be used to differentiate BOO from BD. However, some conventional urodynamic parameters can be used as screening tools to differentiate female voiding dysfunction subgroups. However, owing to some poor ROC areas, videourodynamic studies should be used for final diagnosis in controversial cases as needed.

Concluding message

The largest cohort of videourodynamic findings of women with voiding dysfunction was presented. Some urodynamic parameters can be used as screening tools for assessing women with VD.

Table 1. Comparisons of videourodynamic diagnoses in women with symptoms of voiding dysfunction (n=1,914)

Variables	BOO (n=810)	BD (n=1,048)	Normal (n=56)	P†	BOO vs. BD, P‡
Age (years)	59.3±16.7	64.7±16.2	54.0±14.3	0.0001	<0.0001
DO	282 (35)	306 (29)	0 (0)	0.0001	0.01
FSF (mL)	141±69	157±92	167±72	0.003	0.02
FS (mL)	223±97	235±117	290±103	0.0001	0.26
Compliance (mL/cmH ₂ O)	71.7±84.8	63.5±78.9	84.8±72.0	0.001	0.0003
VV (mL)	202±142	152±120	489±114	0.0001	<0.0001
PVR (mL)	126±139	176±189	20±29	0.0001	<0.0001
Capacity (mL)	329±150	328±154	508±120	0.0001	0.31
PdetQmax (cmH ₂ O)	33±23	14±11	17±8.2	0.0001	<0.0001
Qmax (mL/s)	8.9±6.2	7.8±6.5	24.1±7.8	0.0001	<0.0001
AG number	15.6±26.3	-1.6±14.4	-31.0±17.5	0.0001	<0.0001
VV/capacity (%)	0.63±0.32	0.53±0.37	0.96±0.05	0.0001	<0.0001
Hypertension	161(20)	269 (26)	6 (11)	0.043	0.04
Diabetes	162 (20)	166 (16)	8 (14)	0.053	-
CAD	23 (3)	41 (4)	2 (4)	0.45	-
CKD	19 (2)	21 (2)	2 (4)	0.68	-
COPD	13 (2)	9 (1)	0 (0)	0.23	-
Qmax at UFM (mL/s)	12.5±8.6	12.9±8.4	-	-	0.66
VV at UFM (mL)	196±132	176±124	-	-	0.25
PVR at UFM (mL)	129±122	174±184	-	-	0.22

†: By Kruskal-Wallis test, ‡: By Wilcoxon rank-sum test. §: Data were expressed as mean ± standard deviation or number (percentage). AG number=PdetQmax-2*Qmax; BD: bladder dysfunction, BOO: bladder outlet obstruction, CAD: coronary artery disease, CKD: chronic kidney disease, COPD: chronic pulmonary disease, DO: detrusor overactivity, FS: full sensation, FSF: First sensation of filling, PdetQmax: detrusor pressure at Qmax, PVR: post-void residual, Qmax: maximum flow rate, UFM: uroflowmetry, VV: voided volume.

Table 2. Comparisons of videourodynamic diagnoses with bladder outlet obstruction (n=810)

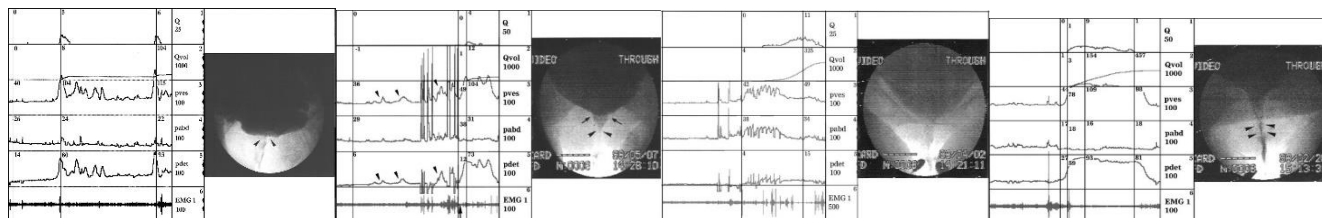
Variables	BOO		P†	Functional BOO			P‡
	Functional (n=761)	Anatomic (n=49)		BND (n=100)	DV (n=325)	PRES (n=336)	
Age (yrs)	59.4±13.8	57.8±16.7	0.81	64.1±17.1	61.1±16.5	56.5±15.9	0.0001
DO	260 (34)	22 (45)	0.13	46 (46)	195 (60)	19 (6)	<0.001
FSF (mL)	141±54	141±57	0.70	138±78	130±69	154±64	0.0001
FS (mL)	223±77	214±80	0.48	209±103	197±95	253±90	0.0001
Compliance (mL/cmH ₂ O)	73±55	59±46	0.10	61±70	63±77	85±95	0.0001
VV (mL)	205±116	166±120	0.044	142±143	179±125	248±143	0.0001
PVR (mL)	126±109	131±109	0.58	216±187	121±123	104±126	0.0001
Capacity (mL)	331±119	297±109	0.18	358±176	300±145	352±143	0.0001
PdetQmax (cmH ₂ O)	32±17	49±29	0.006	39±24	46±18	17±12	0.0001
Qmax (mL/s)	9.0±4.7	7.0±4.6	0.005	6.0±5.6	9.4±6.1	9.6±6.2	0.0001
AG number	14±19	35±30	0.0002	27±26	27±23	-2±15	0.0001
VV/capacity (%)	0.63±0.28	0.54±0.30	0.06	0.41±0.37	0.62±0.31	0.71±0.30	0.0001

†: By Wilcoxon rank-sum test. ‡: By Kruskal-Wallis test. §: BND=bladder neck dysfunction, DV: dysfunctional voiding, PRES: poor relaxation of external sphincter, Data expression and the other abbreviations were as Table 1.

Table 3. Comparisons of videourodynamic diagnoses with bladder dysfunction (n=1,048)

Variables	AD (n=106)	DU (n=337)	DHIC (n=231)	DO (n=49)	BO (n=325)	P†
Age (years)	62.5±13.8	67.8±14.5	75.6±9.5	67.5±15.3	54.1±16.0	0.0001
DO	2 (2)	11 (3)	231 (100)	49 (100)	13 (4)	<0.001
FSF (mL)	207±118	196±106	139±72	131±70	118±53	0.0001
FS (mL)	300±132	289±129	196±101	186±92	194±72	0.0001
Compliance (mL/cmH ₂ O)	51±87	70±93	58±69	51±55	66±69	0.0001
VV (mL)	81±109	116±123	104±82	230±124	235±86	0.0001
PVR (mL)	331±199	271±198	195±143	28±41	34±75	0.0001
Capacity (mL)	412±162	387±169	299±156	258±125	269±90	0.0001
PdetQmax (cmH ₂ O)	4.7±8.1	8.5±9.8	18.0±9.4	20.3±10.1	18.8±9.6	0.0001
Qmax (mL/s)	3.6±5.4	4.9±5.3	6.3±4.4	13.0±8.3	12.4±5.9	0.0001
AG number	-2.5±12.7	-1.3±12.9	5.4±13.7	-5.7±21.1	-6.0±13.8	0.0001
VV/capacity (%)	0.23±0.30	0.34±0.34	0.36±0.22	0.88±0.14	0.88±0.20	0.0001

†: By Kruskal-Wallis test. AD: acontractile detrusor, BO: bladder oversensitivity, DHIC: detrusor hyperactivity with impaired contractile function, DU: detrusor underactivity. Data expression and the other abbreviations were as Table 1.

**Fig 1.** Videourodynamic findings of subtypes of bladder outlet obstruction: (A) bladder neck dysfunction, (B) dysfunctional voiding, (C) poor relaxation of pelvic floor muscle and (D) urethral stricture.**Disclosures**

Funding: none **Clinical Trial:** Yes **Public Registry:** No **RCT:** No **Subjects:** HUMAN **Ethics Committee:** Research Ethics Committee, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation **Helsinki:** Yes **Informed Consent:** Yes