Urodynamic Pattern Distribution Among Aged Male Patients With Lower Urinary Tract Symptoms Suggestive of Bladder Outlet Obstruction

Danfeng Xu, Xingang Cui, Chuangyu Qu, Lei Yin, Cunzhou Wang, and Jie Chen

OBJECTIVE To develop a urodynamic study (UDS) pattern system for aged male patients who complained of non-neurogenic lower urinary tract symptoms (LUTS) to create a reference guideline for their diagnosis and treatment by a retrospective analysis.

METHODS A retrospective analysis of UDS data was carried out in 1984 male patients neurologically intact with symptoms suggestive of bladder outlet obstruction (BOO) aged older than 45 years (2002-2013). On the basis of their UDS characteristic findings, the patients were classified into 1 of 7 subgroups: equivocal or mild BOO with sphincter synergia with or without idiopathic detrusor overactivity (pattern A); equivocal or mild BOO with idiopathic sphincter overactivity (B); classic BOO with sphincter synergia (C) or overactivity (D); BOO with only detrusor low compliance (E); BOO with both detrusor underactivity and low compliance (F); and equivocal BOO with detrusor underactivity (G). The follow-up data were reviewed and analyzed thereafter.

RESULTS The feasibility and rationality of this system were confirmed. The distribution of 7 patterns (pattern, case number, %) was A 158, 8%; B 59, 3%; C 1059, 53.3%; D 277, 14%; E 120, 6%; F 93, 4.7%; and G 218, 11%. A-G numbers in pattern C, D, and E were 103.1-141.4, higher than other patterns ($P < .001$), and functional pressure lengths of pattern C and D were 7.0-7.2 cm, longer than other patterns ($P < .001$).

CONCLUSION A practical UDS pattern system for aged male patients with lower urinary tract symptoms suggestive of BOO was constructed, which can be used to optimize the diagnosis and treatment of these patients. UROLOGY 83: 563–569, 2014. © 2014 Elsevier Inc.

The prevalence of lower urinary tract symptoms (LUTS) has been estimated in approximately 16% of people in Europe and the United States.[1,2] A large multinational study revealed that 90% of men aged 50-80 years have either storage or voiding troubles, and many men have both storage and voiding symptoms.[1,2] It has been estimated that only 25%-50% of men with histologically confirmed benign prostatic hyperplasia (BPH) have LUTS and that urodynamic bladder outlet obstruction (BOO) is found in only 48%-53% of men referred for investigation of LUTS.[1,2] In a video-urodynamic study, Kuo[2] revealed only 29.4% of 1407 male patients older than 45 years with LUTS had BPH-caused BOO, and other causal factors were idiopathic detrusor overactivity (IDO) or underactivity (DUA), urethral sphincter pseudodyssynergia, or poor relaxation of urethral sphincter. In our experience, urethral sphincter pseudodyssynergia and poor relaxation of urethral sphincter, actually surrogate of non-neurogenic or idiopathic sphincter overactivity (ISO), could be defined by anal sphincter electromyography (EMG).[3,4] Functional states of the detrusor and sphincter (either overactive, normoactive, or underactive) constructed the basis of the European Association of Urology–Madersbacher classification system for neurogenic lower urinary tract dysfunction.[3] However, in aged men with non-neurogenic lower urinary tract dysfunction (LUTD), detrusor compliance and outlet obstruction had better to be considered together with functional states of lower urinary tract.[5]

In the study by Kuo, the prevalence of these causal factors was evaluated separately for the whole group, and we believe it is more important to present them as specific

Danfeng Xu and Xingang Cui contributed equally.

Financial Disclosure: *The authors declare that they have no relevant financial interests.*

From the Department of Urology, Changzheng Hospital, Second Military Medical University, Shanghai, China

Reprint requests: Lei Yin, M.D., Ph.D., Department of Urology, Changzheng Hospital, Second Military Medical University, No. 440, North Chengdu Road, P.O. Box 200003, China. E-mail: yin2022@hotmail.com

Reprint requests: Chuangyu Qu, M.D., Urodynamic Institution, Changzheng Hospital, Second Military Medical University, No. 440, North Chengdu Road, P.O. Box 200003, China. E-mail: qu_cy@sohu.com

Submitted: August 8, 2013, accepted (with revisions): October 24, 2013

0090-4295/14/$36.00

http://dx.doi.org/10.1016/j.urology.2013.10.033

patterns at the base of individualization. One might have 1, 2, or 3 functional disorders, and defining the patterns is crucial for their causal treatment: either surgery is needed or only medicinal treatment is enough? Our aim was to build such a system by which the urodynamic patterns of male patients older than 45 years with LUTS suggestive of BPH-caused BOO can be evaluated retrospectively, and their distribution in the population can be validated and presented according to International Continence Society (ICS) standard. The practical and clinical purposes of the analysis were to decrease unnecessary operation rates for those who suited to medicinal treatment as first option and to increase the surgical success rate for those operative treatments is inevitable. Because of the absence of validated methods to define sphincter underactivity in male patients, this functional abnormality was avoided in the process thereafter.

MATERIALS AND METHODS

Patients and Criteria

A cohort of 1984 men hospitalized for the investigation of LUTS from May 2002 to February 2013 was reviewed. Patients with occult or overt neuropathy (multiple sclerosis, multiple system atrophy, dementia, Parkinson's disease, diabetes mellitus, cerebrovascular disorder, spinal cord injury, and so forth), previous transurethral surgery, or active urinary tract infection were excluded. The patients were assessed for their LUTS using the International Prostatic Symptom Score (IPSS) and its associated quality of life index. Three items were included as storage symptoms (frequency, urgency, and nocturia) and 4 as voiding symptoms (hesitancy, intermittency, straining, and a slow stream). Only patients with a moderate IPSS (>8) and a quality of life index >3 were included in this study.[2,6,7] Urgency sensation was scored from 0 to 3 using the Indevus Urgency Severity Scale, and only a score of 2 or more was considered as clinically significant urgency. Patients with LUTS were evaluated at the outpatient clinic for outlet obstruction, detrusor or spincter overactivity, and treated according to the resulting clinical and urodynamic diagnosis. Therapy with alpha-blocker, antimuscarinic agents, or GABA-ergic (γ-aminobutyric acid) agonist baclofen has been approved to be effective for some kind of LUTS in urodynamic published data.[4,8] After urodynamics, patients with potentially severed detrusor who cannot initiate voiding during voiding phase were catheterized again and administered with pyridostigmine bromide, balclofen, and decoctions of Chinese medicinal herbs for 4-6 weeks with the purpose of waiting for recovery of mictuition reflex, and their results were followed up carefully.

Urodynamic Study

The urodynamic investigations (with Urovision Janus, Life Tech, USA; Solar, MMS, Netherland; and Andromeda, Germany) included uroflowmetry (free maximal flow rate [Qmax]), filling cystometrography, voiding pressure-flow study (PFS), external anal sphincter EMG, and urethral pressure profilometry according to previously described techniques.[4,8,9] Methods, definitions, and units were used according to the standards recommended by the ICS,[7] except where specifically noted. Normal compliance was defined as more than 10 mL/cm H_2O.[5] An 8F double-lumen transurethral catheter

Table 1. Urodynamic study pattern and parameters of male patients older than 45 y neurologically intact with symptoms suggestive of bladder outlet obstruction (n = 1984)*

Variable		Mean ± SD								
UDS Pattern		A (n = 158, 8%)	B (n = 59, 3%)	C (n = 1074, 53.3%)	D (n = 277, 14%)	E (n = 120, 6%)	F (n = 93, 4.7%)	G (n = 218, 11%)	F Value	*P* Value
Age (y)		58.6 ± 7.3	59.9 ± 6.3	58.8 ± 5.8	58.6 ± 7.1	58.8 ± 5.6	59.6 ± 5.5	59.2 ± 7.3	0.35	.911
UDS parameters	PdetQmax (cm H_2O)	66.4 ± 10.3	65.8 ± 9.5	116.3 ± 16.3	113.9 ± 12.5	147.7 ± 13.5	–	–	264	.001
	Qmax, (mL/s)	7.1 ± 1.1	6.8 ± 1.2	6.6 ± 1.1	4.9 ± 0.8	3.2 ± 1.1	–	–	118	.001
	A-G number (PdetQmax−2Qmax)	52.2 ± 10.1	52.3 ± 10.5	103.1 ± 15.6	104.1 ± 18.5	141.4 ± 17.9	–	–	299	.001
	TL value	0.5 ± 0.1	−0.5 ± 0.1	1.4 ± 0.1	−0.5 ± 0.1	1.4 ± 0.2	–	–	6201	.001
	Compliance (mL/cm H_2O)	122.4 ± 12.5	144.6 ± 22.0	151.1 ± 15.1	152.1 ± 15.4	7.3 ± 0.4	7.5 ± 0.6	149.5 ± 12.6	176	.001
	MCC (mL)	284.4 ± 20.5	281.1 ± 28.2	264.0 ± 30.9	176.9 ± 21.5	138.0 ± 15.7	137.8 ± 23.2	276.8 ± 16.8	539	.001
	PVR (mL)	67.4 ± 8.5	56.3 ± 10.2	108.6 ± 19.3	123.6 ± 12.1	123.2 ± 10.8	316.9 ± 24.5	308.0 ± 20.5	1133	.001
	MUCP (cmH_2O)	83.2 ± 10.2	84.5 ± 11.3	88.9 ± 10.1	92.5 ± 10.2	89.6 ± 11.1	80.6 ± 10.2	83.2 ± 13.1	18.2	.001
	FPL (cm)	6.2 ± 1.1	6.2 ± 1.0	7.2 ± 0.9	7.0 ± 1.3	6.2 ± 0.9	6.2 ± 1.1	6.3 ± 1.2	99	.001
IPSS score	Storage	10.1 ± 2.1	10.2 ± 1.4	10.7 ± 1.9	12.0 ± 1.9	12.4 ± 1.2	12.6 ± 1.1	12.9 ± 2.1	78.6	.001
	Voiding	10.6 ± 1.2	11.8 ± 0.9	11.7 ± 1.6	11.7 ± 1.1	11.1 ± 1.0	12.3 ± 0.9	12.7 ± 1.1	27.1	.001
	Total	20.7 ± 1.3	22.0 ± 1.1	22.4 ± 2.1	23.7 ± 1.7	23.5 ± 1.6	25.0 ± 1.5	25.6 ± 1.9	82.2	.001

FPL, functional profile length; IPSS, International Prostatic Symptom Score; MCC, maximal cystometric capacity; MUCP, maximal urethral closure pressure; PdetQmax, detrusor pressure at Qmax; PVR, postvoiding residual; Qmax, maximal flow rate; SD, standard deviation; UDS, urodynamic study.

* With UDS-verified intact detrusor (n = 1673) and with detrusor potentially severed (n = 311).