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Shahab N[1], Seki N[1], Takei M[2], Yamaguchi A[2], Naito S[1]
1. *Department of Urology, Graduate School of Medical Sciences, Kyushu University Hospital, Fukuoka, Japan,* ***2.*** *Department of Urology, Harasanshin Hospital, Fukuoka, Japan*

THE PROFILES AND PATTERNS OF DETRUSOR OVERACTIVITY AND THEIR ASSOCIATION WITH OVERACTIVE BLADDER SYMPTOMS IN MEN WITH BENIGN PROSTATIC ENLARGEMENT ASSOCIATED WITH DETRUSOR OVERACTIVITY

Hypothesis / aims of study

To investigate the association of both the urodynamic profiles and patterns of detrusor overactivity (DO) with the severity of the symptoms related to overactive bladder (OAB) in men with symptomatic benign prostatic enlargement (BPE) associated with DO.

Study design, materials and methods

A total of 231 men with symptomatic BPE associated with DO who had undergone a transurethral resection of the prostate (TURP) in this hospital between January 1993 and December 2000 were analyzed retrospectively. The exclusion criteria included urinary tract infection, stones or neoplasms, urethral or bladder neck stricture, neurologic disorders, or any other condition or drug treatment that might interfere with bladder function, urine production rate, or voiding habits. The severity of the preoperative symptoms related to OAB (urgency, nocturia and frequency) were graded based on the international prostate symptoms scores (IPSS). Transrectal ultrasound was used to estimate the prostate volume, and a full urodynamic study, including a pressure flow study (PFS) in addition to clinical evaluation of the medical history, physical examination, urinalysis, and renal function assessment were all performed preoperatively. The recent terminology and definition of OAB and DO including the DO patterns according to the International Continence Society (ICS) were used. The number of DO pattern which showed how frequent DO occurred in every patient during the urodynamic study was added in this study. The DO profiles (**figure 1**) included the amplitude of DO or the maximum DO pressure (MDOP), the time to reach MDOP (MDOP time), the ratio of MDOP to MDOP time (MDOP velocity), the total time of DO (DO time), the bladder volume at the first DO (BV@FDO) and detrusor pressure at the first DO (Pdet@FDO). The DO patterns were categorized into three groups which consist of the type of DO (phasic or terminal), incontinence at DO (presence or absence) and number of DO (multiple or single). Mixed phasic and terminal DO were categorized as terminal DO since terminal DO was the predominant pattern of DO. If more than one episode of DO was found based on the urodynamic results, only the predominant DO was recorded. The quantitative data are represented as the mean plus or minus standard deviation. The association of the DO patterns with the OAB related symptoms scores were analysed using Student's *t* test while the association of the DO profiles with the OAB related symptoms scores were analysed using Spearman's correlation test. Values of *p* less than 0.05 were considered to be statistically significant.

Results

Among the 231 patients, the mean age was 72.7 ± 7.0 years and the mean prostate volume was 46.0 ± 19.5 mL. OAB symptoms (urgency symptom alone or in combination with the symptoms of nocturia or/and frequency) were found in 211 patients (91,3%). The mean MDOP, MDOP time, MDOP velocity, DO time, BV@FDO and Pdet@FDO were 76.2 ± 43.7 cmH_2O, 37.4 ± 30.8 s, 3.0 ± 2.1 cmH_2O/s, 97.4 ± 69.2 s, 217 ± 97 mL and 9.1 ± 5.8 cmH_2O respectively. Terminal DO was found in 127 (55.0%) patients while phasic DO was found in 104 (45.0%) patients. Incontinence absence at DO was found in 104 (45%) while incontinence presence at DO was found in 127 (55%) patients. Multiple DO was found in 83 (35.9%) patients while single DO was found in 148 (64.1%) patients. No correlation was found between DO profiles and the severity of symptoms related to OAB. The scores of the urgency symptoms were significantly higher in terminal DO in comparison to those in phasic DO, while the nocturia symptom scores were found to be significantly higher in single DO in comparison to those in multiple DO (Table 1).

Interpretation of results

Since urgency symptom is the key symptom of OAB according to the recent ICS terminology, terminal DO is therefore considered to be the most important DO pattern in association with the severity of the symptoms of OAB. The most sensitive afferents in the bladder are 'in-series' tension receptors, activated by an increase in volume and by detrusor contraction. These low threshold afferents have nerve endings located in the detrusor smooth muscle and have mostly small myelinated axons (A-δ).(1) The significantly higher amplitude of the DO pressure and the longer DO time in patients with a terminal DO pattern may possibly help to explain the association with the urgency symptoms since the longer time of high pressure can stimulate the nerves, thereby inducing the sensation of urgency. Beside that, other study (2) reported that the higher the detrusor contraction velocity, the higher the possibility not only of the chance to feel urgency but also of the urgency degree. In this study, we measured specifically the velocity of DO and found that the velocity of DO was significantly higher in incontinence presence at DO pattern in comparison to that in incontinence absence at DO pattern. Although the difference of the severity of the symptoms related to OAB was not significantly found in this group of DO pattern and the symptoms were not recorded during urodynamic study, the stimulation of fast stretch receptors and conveyed to the cerebral cortex via C-afferent fibres which further caused involuntary bladder contraction and micturation may possibly explain why the velocity of DO was higher in incontinence presence at DO pattern.(3)

Concluding message

The DO patterns are thus considered to be important in the analysis of the urodynamic results because a significant association was established between the urodynamic patterns of DO and the severity of the symptoms related to OAB while no association was found between the urodynamic profiles of DO and the severity of the symptoms related to OAB. The amplitude and duration of DO may therefore possibly affect the severity of the symptoms.

References

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3. Neurourol Urodyn (1993) 12; 463-471.

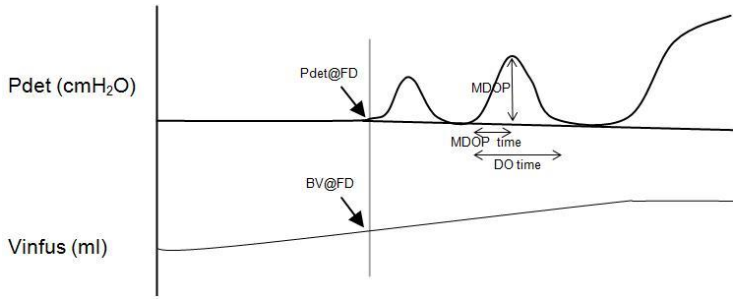
Table 1. The association of the severity of the symptoms related to OAB and the DO profiles with the DO patterns.

	DO Patterns					
	Number of DO		Type of DO		Incontinence at DO	
	Multiple	Single	Terminal	Phasic	Presence	Absence
Urgency Frequency Nocturia	2.8 ± 1.4	3.2 ± 1.4*	3.0 ± 1.6	2.6 ± 1.6*		
MDOP (cmH_2O)	60.8 ± 42.6	84.8 ± 42.1**	105.1 ± 36.0	40.9 ± 19.7**	105.2 ± 35.6	40.8 ± 20.3*
MDOP time (s)			47.0 ± 31.5	25.5 ± 25.4**	45.5 ± 29.0	27.4 ± 30.2**
MDOP velocity (cmH_2O/s)					3.3 ± 2.2	2.6 ± 1.9**
DO time (s)	79.6 ± 63.9	107.4 ± 70.2**	131.0 ± 65.4	56.4 ± 48.7**	129.3 ± 64.1	58.5 ± 53.7**
BV@ FDO (mL)						
Pdet@FDO (cmH_2O)			10.0 ± 6.4	7.92 ± 4.76**	10.1 ± 6.3	7.8 ± 4.8**

Mean ± SD

* $p < 0.05$, ** $p < 0.001$ for multiple vs single, terminal vs phasic and presence vs absence.

Figure 1. The illustration of urodynamic profiles of DO



Specify source of funding or grant	**NONE**
Is this a clinical trial?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**No**
This study did not require eithics committee approval because	**This is a retrospective study using a secondary data of our databases obtained from Kyushu University Hospital and Harasanshin Hospitals and no ethical approval was needed regarding this retrospective research.**
Was the Declaration of Helsinki followed?	**No**
This study did not follow the Declaration of Helsinki in the sense that	**This is a retrospective study using a secondary data of our database obtained from Kyushu University Hospital and Harasanshin Hospital.**
Was informed consent obtained from the patients?	**No**