

COMPARISON OF URODYNAMIC PARAMETERS IN ACCORDANCE WITH POSTURES IN PATIENTS WITH BENIGN PROSTATIC HYPERPLASIA: A PROSPECTIVE RANDOMIZED STUDY

Hypothesis / aims of study

Aged men often develop lower urinary tract symptoms (LUTS). Benign prostate hyperplasia (BPH) is considered as a major cause of male LUTS. Urodynamic study (UDS) is commonly performed to evaluate bladder outlet obstruction (BOO) and detrusor overactivity (DO). Filling cystometry can be performed in postures of supine, sitting or standing. It is reported that significant differences of DO were occurred at different postures during filling cystometry [1]. However, there was no consensus on postures during filling cystometry in the guideline of ICS 2002 or in the guideline of AUA/SUFU 2012. The aims of this study were to investigate whether patients' posture might influence urodynamic parameters and find out which posture conforms with patient symptoms.

Study design, materials and methods

Inclusion criteria of this study were patients with LUTS/BPH aged over 45 who were going to have UDS in our urology outpatient clinic. Exclusion criteria were neurogenic bladder, bladder stone, acute urinary tract infection, previous administration of anti-cholinergics within one month, genitourinary cancer, urethral stricture, renal or hepatic insufficiency or serum PSA higher than 10ng/dl. The following examinations were carried out for assessment: patient history, digital rectal examination, international prostate symptom score (IPSS), overactive bladder symptom score (OABSS), frequency volume chart (FVC), serum prostate specific antigen (PSA) and transrectal ultrasonography of the prostate. After informed consent, the patients were randomly assigned supine and standing groups (1:1) using on-line randomization system of our hospital. Then the patients underwent UDS with above assigned posture.

Primary outcome was difference of presence of DO in each posture. DO was defined as involuntary detrusor contraction more than 5cmH₂O in filling cystometry. Secondary outcome was to compare clinical indexes with urodynamic parameters: overactive bladder based on OABSS were compared with presence of DO, Maximum voided volume (MVV) of FVC also compared with maximum cystometric capacity (MCC). The diagnostic criterion of OAB was established as the urgency score of OABSS \geq 2 and the total score of at least 3.

Continuous variables are presented as means with standard deviation (SD) and analysed by using two sample independent T-test. Categorical variables are presented as numbers with percent and analysed by Using Chi-square test. Statistical test of agreement were performed using Cohen's kappa index and intraclass correlation coefficient (ICC). Statistical analyses were performed using IBM-SPSS® version 22.0 (IBM Corp., Armonk, NY, USA, 2013).

Results

A total 42 men with mean age of 69.5(\pm 6.0, SD) (range 54-82) years were enrolled in this study. Demographic data is presented in (Table 1). The presence of DO were 33.3% (7/21) in a supine posture and 90.5% (19/21) in a standing posture (p <0.001). DO with an amplitude of 15cmH₂O were 23.8% (5/21) in a supine posture and 52.4% (11/21) in a standing posture (p =0.057). First sensation of bladder filling (FSF) was significantly different between supine and standing postures (p =0.045).

Overall agreement between OAB and DO in a supine posture was 71.4% (15/21), yielding a Cohen's kappa of 0.44 (95% CI 0.26-0.62, moderate agreement). In a standing posture, overall agreement between OAB and DO was 38.1% (8/21), yielding a Cohen's kappa of 0.08 (95% CI 0.02-0.14, slight agreement) (Table 2). Comparison between MVV and MCC in each posture is presented in (Table 3). ICC between MVV and MCC were 0.66 (95% CI 0.32-0.84, good agreement) in a supine posture and 0.14 (95% CI -0.31-0.54, poor agreement) in a standing posture.

Interpretation of results

We found a significant difference of urodynamic parameters between supine and standing postures during filling cystometry. FSF appeared at lower filling volume and presence of DO was less frequent at supine posture. We believe standing posture makes bladder more sensitive and overactive during filling cystometry. Supine posture was more conformable to bladder capacity and OAB. We thought standing posture might have resulted in false positive occurrence of DO.

Concluding message

Our study demonstrated that supine posture and standing posture during filling cystometry produced different results. Supine posture correlated better with subjective symptoms.

Table 1 Baseline demographic and urodynamic parameters

	Supine (n=21)	Standing (n=21)	P-value
Age, years	69.9 ± 6.5	69.2 ± 5.7	0.726*
BMI, kg/m ²	24.1 ± 1.7	23.3 ± 3.1	0.338*
PSA, ng/dl	2.5 ± 2.2	2.6 ± 2.3	0.910*
Prostate volume, ml	44.7 ± 20.3	51.1 ± 20.6	0.312*
IPSS score (0-35)	19.4 ± 9.4	15.1 ± 8.4	0.130*
OABSS score (0-17)	5.2 ± 3.8	4.1 ± 3.1	0.310*
First sensation of bladder filling, ml	213.2 ± 85.3	157.2 ± 87.4	0.045*
First desire to void ml	215.4 ± 85.9	160.6 ± 88.6	0.054*
Strong desire to void, ml	339.3 ± 116.1	317.2 ± 86.4	0.571*
Capacity, ml	351.1 ± 130.5	295.0 ± 145.6	0.196*
Compliance, ml/cmH ₂ O	64.3 ± 46.4	41.4 ± 23.9	0.062*
DO occurrence	7 (33.3%)	19 (90.5%)	<0.001 [^]
DO ≥15cmH ₂ O	5 (23.8%)	11 (52.4%)	0.057 [^]
Bladder outlet obstruction index	31.1 ± 14.5	36.0 ± 20.3	0.378*
Post void residual, ml	82.1 ± 98.7	130 ± 152.3	0.234*
MUCP, cmH ₂ O	86.1 ± 26.6	78.6 ± 18.7	0.292

*Two sample independent T-test, [^]Chi-squared test.

DO=detrusor overactivity, MUCP=Maximum urethral closure pressure. (Values are given as mean ± SD or numbers (percent))

Table 2 Correlation between overactive bladder and detrusor overactivity

	Supine			Standing			
	OAB(-)	OAB(+)	kappa	OAB(-)	OAB(+)	kappa	
DO(-)	9	5	0.44[0.26-0.62]	DO(-)	2	0	0.08[0.02-0.14]
DO(+)	1	6		DO(+)	13	6	

OAB=overactive bladder, DO=detrusor overactivity

Table 3 Correlation between maximum voided volume and maximum cystometric capacity

	Supine	Standing
Maximum voided volume	346.9 ± 95.9	374.0 ± 82.0
Maximum cystometric capacity	351.0 ± 130.5	282.1 ± 136.6
Intraclass correlation coefficient	0.66 [0.32-0.84]	0.14 [-0.31-0.54]

References

1. Al-Hayek S, Belal M, Abrams P. Does the Patient's Position Influence the Detection of Detrusor Overactivity? *Neurourol Urodyn* 2008;27:279-86.

Disclosures

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