

LOWER URINARY TRACT DYSFUNCTION IN PATIENTS WITH PARKINSON'S DISEASE AND ITS CORRELATION WITH AUTONOMIC NERVOUS SYSTEM FUNCTION

Hypothesis / aims of study

Non-motor symptoms of Parkinson's disease (PD) patients are considered to be strongly related to autonomic nervous system function. Our study aims to assess correlation between lower urinary tract dysfunction and autonomic nervous system function of PD.

Study design, materials and methods

This study included 24 patients with Parkinson's disease having lower urinary tract symptoms who underwent rehabilitation in our hospital. All patients underwent pressure-flow urodynamics. Urodynamics consisted of filling cystometry at rate of 40 mL/min and voiding cystometry with surface electromyography. Urodynamic parameters measured included: first desire to void (FDV), maximum cystometric capacity (MCC), compliance, reflex volume (RV), Qmax, PdetQmax, postvoid residual (PVR), bladder contraction index (BCI), presence of increased bladder sensation (IBS) when first desire to void <100 mL, low compliance bladder (LCB) when bladder compliance <20, detrusor overactivity (DO), urge incontinence (UI), Impaired urethral relaxation (IUR), bladder outlet obstruction (BOO) if BOOI >40 and detrusor underactivity (DU) if BCI <80.

For measurements of ANS functions, a heart rate variability analysis method was used. An electrocardiogram (ECG) was equipped, and ECG measurements were made in a resting state (sitting position) for 3 minutes, and, for a standing load, in a standing position for 3 minutes. For measurement data, real-time analysis was performed using heart-rate variability analysis software of CROSSWELL Co., Inc. Computed were heart rate (HR), low-frequency (LF) component and high-frequency (HF) component of heart-rate variability, and the heart-rate variability coefficient (coefficient of variation of R-R intervals, or CVRR); LF/HF was used as the ANS balance (SNS index), CCVHF as the parasympathetic nervous system (PSNS) index, and CVRR as the variability of overall ANS activity. Then comparative investigation was made of these values with normal values computed from 22 healthy persons.

Results

Patient characteristics are listed in table 1. Findings from urodynamic study (UDS) are listed in table 2 and 3. The results of urodynamic findings showed that DO was noted in 62.5%, IUR was noted in 50% of patients. In measurements of ANS functions, for PD patients, HR were high ($p=0.04$), CVRR were low ($p<0.01$) when at rest (sitting position) compared with healthy persons. When standing, CVRR were more reduced ($p=0.01$). In PD patients with DO, CVRR decline when standing were larger than patients without DO. In PD patients with IUR, compared with healthy persons, CVRR and CCVHF were low ($p<0.01$) when at rest and CVRR decline when standing were small ($p=0.04$).

Age(y)	69.6 ± 5.8	(60–79)
Gender	Male : 16	Female : 8
Hoehn–Yahr	2.9 ± 0.8	(1–4)
Chief complaint	Pollakisuria,	23
	Urge incontinence	
	Dysuria	1

Urodynamic parameters	Mean ± SD
FDV (ml)	134.2 ± 56.8
MCC (ml)	199.9 ± 93.4
Compliance (ml/cmH ₂ O)	27.7 ± 13.4
PdetQmax (cmH ₂ O)	49.5 ± 25.9
Qmax (ml/s)	6.5 ± 2.7
PVR (ml)	71.3 ± 83.4
BCI	81.7 ± 25.1
BOOI	36.5 ± 28.1

Table3. Urodynamic findings	
Urodynamic findings	Number(%)
IBS	7 (29.2%)
LCB	8 (33.3%)
DO	15 (62.5%)
UI	16 (66.7%)
IUR	12 (50%)
BOO	11 (45.8%)
DU	9 (37.5%)

Interpretation of results

These results explain that PD patients have small ANS activity at rest and small orthostatic autonomic response. It is said that the sympathetic nervous system contributes in the storage phase of urine. Therefore, these results suggests that orthostatic autonomic response correlate with storage function in PD patients.

Concluding message

Lower urinary tract dysfunction was common in PD patients not only during but also voiding. Previous reports showed that DO+DU was the most common finding in PD patients. A larger scale study will be necessary to assess association between autonomic nervous system function and lower urinary tract dysfunction in patients with PD.

References

1. T Uchiyama et al. Urinary dysfunction in early and untreated Parkinson's disease. J Neurol Neurosurg Psychiatry 2011;82:1382-1386.
2. K Terayama et al. Weak detrusor contractility correlates with motor disorders in Parkinson's disease. Movement Disorders, Vol. 27, No.14, 2012 : 1775-1780

Disclosures

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