

INVESTIGATION OF AUTOMATIC NERVOUS SYSTEM ACTIVITY OF OVERACTIVE BLADDER SYNDROME PATIENTS USING AN “AUTONOMIC REFLEX ORTHOSTATIC TEST”

Hypothesis / aims of study

The majority of overactive bladder (OAB) cases are idiopathic non-neurogenic type, the mechanisms of which are not sufficiently known. The autonomic nervous system (ANS) is a pathway that links the afferent and efferent pathways of the brain and bladder, and it is possible that dysfunction of the ANS is related to the pathologies of idiopathic OAB. In this study, with OAB patients as subjects, with the imposition of an active standing load, investigation was made of changes in ANS activity using the autonomic reflex orthostatic tolerance test (CROSSWELL Co., Inc.) which enables quantitative analysis of dynamic ANS functioning. (Fig. 1)

Study design, materials and methods

After exclusion of initial-examination OAB patients with complications having affects on neurogenic and ANS functions, subjects were 42 patients having, within their respective overactive bladder symptom scores (OABSS)¹⁾, urgency of 2 points or more and a total score of 3 points or more (males: 17, females: 25, mean age: 69.6 ± 8.9 years). 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 three (3) minutes, and, for a standing load, in a standing position for three (3) minutes. For measurement data, real-time analysis was performed using heart-rate variability analysis software of CROSSWELL Co., Inc. Computed were heart rate, 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 30 healthy persons (males: 14, females: 16, mean age: 71 ± 8.57 years).

Results

When at rest (sitting position), for OAB patients with an urgency score of 3 points or more, compared with healthy persons, parasympathetic nervous system (PSNS) activity is low (OAB: 0.89 ± 0.55 ms², Control: 1.2 ± 0.44 ms², $p < 0.005$), while sympathetic nervous system (SNS) activity is high (OAB: 5.41 ± 6.17 ms², Control: 1.12 ± 0.46 ms², $p < 0.005$). When standing, confirmed for OAB patients were a 33% decline in ANS activity and a 45% decline in SNS functions. The same tendencies were confirmed for patients having nocturia two (2) or more times, a daytime urinary frequency of 2 points or more, and an urge continence score of 3 points or more.

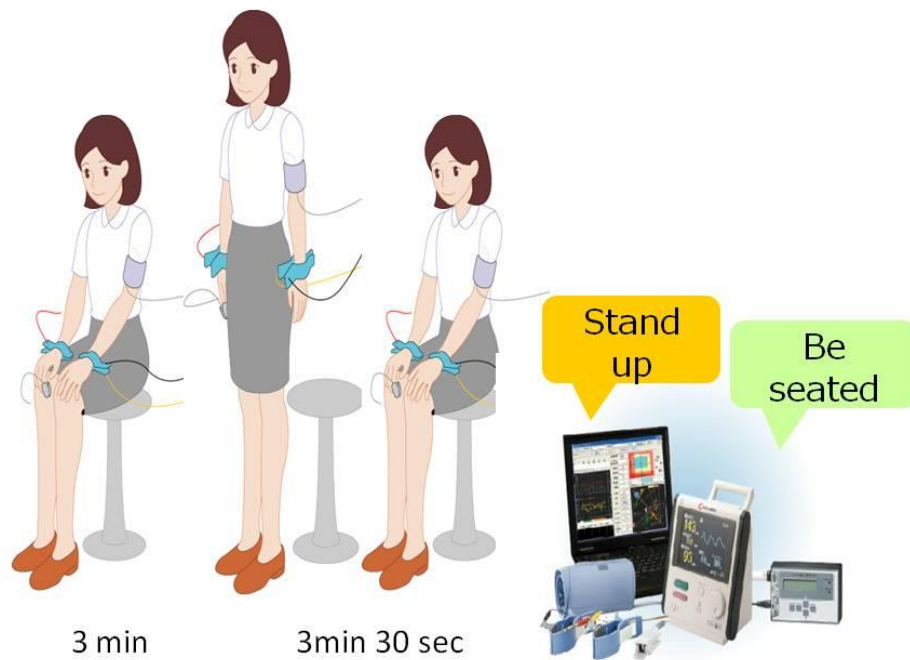
Interpretation of results

In the present study, sympathetic dysfunction was confirmed for OAB patients. It is said that the sympathetic nervous system contributes in the storage phase of urine. The implication in the efferent pathway is simple and well-known: the thoracolumbar sympathetic efferent pathways in the hypogastric and pelvic nerves induce an inhibition of detrusor muscle via beta-adrenoceptors and an excitation of the bladder base and urethra via alpha1-adrenoceptors. Thus, a sympathetic dysfunction could easily take place in storage symptoms. The implication of the hypogastric nerve in bladder sensations remains unclear. Thus, a dysfunction of the sympathetic afferents may be implied in generating an abnormal bladder sensation, such as urgency.

Concluding message

OAB patients, when at rest, have a tendency to favor the sympathetic nervous system, and in many cases, when there is a standing load, a decline is shown in autonomic and sympathetic nervous system functions. There is no data for OAB patients showing the state of the ANS when standing, and it is thought that abnormalities in ANS functions many contribute to the elucidation of OAB pathologies.

Fig 1



References

1. Urology 68: 318-323, 2006.

Disclosures

Funding: No **Clinical Trial:** Yes **Public Registry:** No **RCT:** No **Subjects:** HUMAN **Ethics Committee:** Kinki University Faculty of Medicine, Osaka, Japan **Helsinki:** Yes **Informed Consent:** Yes