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Sensitivity and specificity of neurotrophins as biomarkers of a neurogenic detrusor overactivity in multiple sclerosis patients

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Introduction & Objectives: Lower urinary tract dysfunction (LUTD) including urinary urgency, frequency, and urgency incontinence are common in neurological patients. Traditionally, filling cystometry combined with pressure/flow studies has been a cornerstone of the initial evaluation of all patients with neurogenic LUTD, although recently many investigators are looking forward new noninvasive ways of assessment. For instance, neurotrophins are discussing as potential biomarkers for neurogenic bladder. We tried to examine a predictive value of urine and serum nerve growth factor (NGF) and brain-derived neurotrophic factor (BDNF) in diagnosis of neurogenic detrusor overactivity in multiple sclerosis patients.

Materials & Methods: The study included 20 multiple sclerosis (MS) patients with LUTD. The control group consisted of 20 neurogenically healthy persons without complaints on urgency and with no detrusor overactivity during filing cystometry. In all we performed complex urodynamic study, ultrasound examination of urinary tract, uretrocystoscopy with bladder wall biopsy and further histological and immunohistochemical studies (IHC). IHC studies were done using antiNGF-receptor mouse monoclonal antibodies. Diagnostic value of neurotrophins was estimated with receiver operating characteristic (ROC) curves.

Results: Serum level of NGF demonstrated the highest specificity (93%) with good accuracy of a diagnostic test (AUC=0.806). The sensitivity was 57%. The detection of NGF in the urine had poor accuracy (52% sensitivity, 40% specificity, AUC=0.64). Serum level of BDNF showed 90% sensitivity and only 23% specificity (AUC=0.56; fail accuracy). Urine BDNF was little more informative (86% sensitivity, 26% specificity, AUC=0.65; poor accuracy). Combination of serum NGF and urine BDNF improves diagnostic accuracy (AUC=0.824) and helps to detect detrusor overactivity with sensitivity of 85.7% and specificity of 66.7%. Immunohistochemical analysis showed that NGFR had higher expression in basal layer and apical cells of urothelium in MS patients compared with controls.

Conclusions: Measurement of the neurotrophins levels in serum and urine of MS patients can be used in diagnosis of detrusor overactivity. The correlation between the neurotrophins levels and the rate of detrusor overactivity required further investigations.