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RELATIONSHIP BETWEEN BLADDER DYSFUNCTION AND LESION SITE IN MULTIPLE SCLEROSIS.

Aims of Study

We evaluated voiding dysfunction in multiple sclerosis (MS) by urinary symptoms and urodynamic testings, and then investigated the correlation between the types of voiding dysfunction and the sites of lesion in the central nervous system (CNS).

Methods

Our neurological department is one of the largest clinics for neurodegenerative diseases in Japan. In total, 34 patients with MS had been referred for neurourological evaluation for their lower urinary tract symptoms during last three years. Two male patients with prostatic enlargement were excluded from this syudy. Voiding dysfunction was appraised in 32 patients by the International prostate symptom score and urodynamic tests. The urodynamic tests consisted of simultaneous water cystometry and sphincter electromyography. According to the Kurtzke expanded disability status scale (EDSS), the disease severity was evaluated by each attending neurologist (median EDSS score, 7.25). The disease duration ranged from 0 to 30 years with a median of 9.0. The sites of lesion in the CNS were determined by a combination of neurological examinations and magnetic resonance imaging findings. Fifteen patients had lesions in the cerebrum, 9 in the cerebellum, 20 in the optic nerves, 17 in the brainstem (including 15 in the pons), 28 in the spinal cord (including 15 in the thoracic cord and 19 in the cervical cord).

Results

Compared with reports from Western countries, the ratio of emptying symptoms to filling symptoms was high in Japan. Filling symptom scores were correlated with EDSS scores ($\rho = 0.41$, $p = 0.01$) and the disease duration ($\rho = 0.42$, $p = 0.01$), whereas emptying symptom scores were not. No significant correlation was found between symptom scores and the sites of MS lesion.

Urodynamic evaluation revealed detrusor hyperreflexia in 14 (44 %) of 32 patients, hyporeflexia or areflexia in 12 (38 %), detrusor hyperreflexia with impaired contractile function in 4 (13 %), low compliance bladder in 1 (3 %) and normal detrusor function in 1 (3 %). Of 14 patients with hyperreflexia, 13 had overactive sphincter concurrently. Incompetent sphincter was found in 2 patients with detrusor hyperreflexia with impaired contractility and 1 patient with low compliance bladder. Logistic regression analysis implied the significant correlations between the presence of pontine lesion and detrusor hyporeflexia ($\chi^2 = 5.5$, $p = 0.02$) and between the presence of the cervical cord lesion and detrusor-sphincter dyssynergia ($\chi^2 = 4.3$, $p = 0.04$). The lesion in other sites of the CNS was not related to any type of bladder dysfunction.

	Urodynamic diagnosis					
Site of CNS lesion	Hyper	Hypo	DHIC	low compl	DSD	incompetent sph
Cerebrum	-1.36	1.70	0.13	-0.03	-1.11	-0.49
Cerebellum	-1.06	1.30	-0.03	-0.03	0.05	-0.03
Brainstem	-1.49	1.86	-1.14	-0.03	-1.02	-0.70
(pons)	-2.04	2.36*	-0.90	-0.03	-1.79	-0.49
Optic nerves	1.55	-0.38	0.55	-0.03	0.91	0.16
Spinal Cord	0.41	-0.38	-0.03	-0.02	0.07	0.03
(cervical cord)	0.79	-2.23	-0.26	-0.03	2.05*	0.27

Regression coefficient/standard errors between urodynamic diagnosis and the site of MS lesion in the central nervous system

*Significant positive correlation in Wald test ($p < 0.05$).
Hyper: detrusor hyperreflexia, Hypo: detrusor hyporeflexia, DHIC: detrusor hyperreflexia with impaired contractile function, DSD: detrusor-sphincter dyssynergia (overactive sphincter), incompetent sph: incompetent sphincter (sphincter areflexia).

Conclusions

The present result indicates that detrusor hyporeflexia and detrusor-sphincter dyssynergia are indicative of the presences of pontine lesion and cervical spinal cord lesion, respectively. Thus, the lesion site in the CNS may be a major determinant of the type of bladder and urethral sphincter dysfunction in MS. In our patients sampled in Japan, the proportion of detrusor hyporeflexia and detrusor-sphincter dyssynergia was higher than that in previous reports from Western countries. The high prevalence of emptying symptoms in Japanese MS may reflect that of detrusor hyporeflexia and detrusor-sphincter dyssynergia.