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Yamamoto T[1], Asahina M[1], Yamanaka Y[1], Uchiyama T[2], Hirano S[1], Fuse M[3], Koga Y[4], Sakakibara R[5], Kuwabara S[1]
1. *Depatment of Neurology, Chiba University, Chiba, Japan,* ***2.*** *Department of Neurology, Continence Centre, Dokkyo Medical University, Tochigi, Japan,* ***3.*** *Depatment of Urology, Chiba University, Chiba, Japan,* ***4.*** *Depatment of Molecular Diagnosis, Chiba University, Chiba, Japan,* ***5.*** *Neurology Division, Department of Internal Medicine, Sakura Medical Center, Toho University, Sakura, Japan*

LARGE POSTVOID RESIDUAL IS A STRONG PREDICTOR OF THE DIAGNOSIS OF MULTIPLE SYSTEM ATROPHY IN PATIENTS WITH PARKINSONIAN SYNDROME

Hypothesis / aims of study

Multiple system atrophy (MSA) is clinically characterized by combination of autonomic dysfunction, cerebellar dysfunction and extrapyramidal dysfunction. Lower urinary dysfunction (LUTD) is usually severe and many patients eventually need urethral catheterization in advanced stage. MSA is also clinically classified into two phenotypes: parkinsonism predominant (MSA-P) and cerebellar ataxia predominant (MSA-C). It is difficult to differentiate MSA-P from Parkinson's disease (PD) at least in the early stage. We have previously reported that detailed examination of LUTD by performing urodynamic study (UDS) is useful in differentiating MSA from PD [1]. However, there are many UDS parameters which are difficult to understand for neurologist. We aimed to clarify which UDS parameter is useful for differentiating MSA from PD.

Study design, materials and methods

We retrospectively reviewed 230 case records; both UDS and external anal sphincter electromyography (EAS-EMG) were performed in patients with MSA (n = 146, mean age 64.1 ± 0.53 years, mean duration 3.2 years) and PD (n = 84, mean age 66.2 ± 0.46 years, mean duration 3.2 years). We performed multivariate step-wise logistic regression analysis to determine the useful UDS parameters among post-void residuals (PVR) during free-flow study, the presence or absence of detrusor overactivity (DO), the degree of bladder contraction evaluated by Schafer's nomogram and mean duration of motor unit potentials (MUPs) in EAS-EMG.

Since urodynamic parameters include both quantitative (PVR and mean duration of MUP) and qualitative (presence of DO and bladder contractility evaluated by Schäfer's nomogram) variables, we categorised quantitative parameters into several groups. PVR was categorised into four groups: 0–50, 50–100, 100–150 and > 150 ml. We categorised mean duration of MUP into < 10 ms and > 10 ms.

Results

Urodynamic parameters

PVR during free-flow study was significantly larger in patients with MSA (113.1 ± 7.5 ml) than in patients with PD (40.4 ± 3.8 ml). PVR during PFS was also significantly larger in patients with MSA (230.1 ± 12.6 ml) than in patients with PD (71.7 ± 6.6 ml). The mean duration of MUPs was significantly longer in patients with MSA (9.3 ± 0.1 ms) than in patients with PD (7.7 ± 0.1 ms).The prevalence of DO did not significantly differ between patients with PD and patients with MSA. The severity and prevalence of detrusor contractility were significantly larger in patients with MSA than in those with PD.

Multivariate stepwise logistic regression analysis

Among UDS parameters, PVR > 150 ml during free-flow study strongly indicated a diagnosis of MSA rather than PD (OR 8.723, 95% CI 2.612–29.130, $p < 0.001$). PVR during PFS > 150 ml also indicated a diagnosis of MSA (OR 6.030, 95% CI 2.122–17.137). 'Weak detrusor' also suggested MSA, but the relation was not statistically significant (OR 10.598, 95% CI 0.359–312.473, $p = 0.172$). The presence of DO and neurogenic change in EAS-EMG (mean duration of MUPs > 10 ms) did not significantly contribute to the differentiation of MSA from PD (Table).

Table

	Odds ratio (95%CI)	P value
PVR (free flow) <50ml	Reference	
51-100ml	1.010(0.398-2.575)	.979
101-150ml	1.301(0.385-4.393)	.672
>150ml	8.723(2.612-29.130)	.000
PVR (PFS) <50ml	Reference	
51-100ml	2.258(0.770-6.627)	.138
101-150ml	1.741(0.521-5.813)	.367
>150ml	6.030(2.122-17.137)	.001
Bladder contractility Strong	Reference	
Normal	0.687(0.047-10.047)	.784
Weak	1.450(0.101-20.750)	.784
Very Weak	10.598(0.359-312.473)	.172

Interpretation of results

We have previously reported that urinary voiding dysfunction is more prevalent and severe in MSA compared to PD and measuring PVR might be useful for the differentiation of MSA [1]. However, second consensus criteria of MSA emphasize the presence of urinary incontinence rather than incomplete bladder emptying for the clinical diagnosis of MSA. Many neurologists might be confused with the examination of LUTD in diagnosing MSA or PD because urgent urinary incontinence is also common in PD with advanced stage.

It should be pointed out that PVR > 150 ml during free-flowmetry had a large odds ratio with statistical significance. Although PVR > 150 ml during PFS and impaired bladder contractility also had large odds ratios, PFS is necessary for their examination. PFS is an invasive examination and is not appropriate for routine use.

Based on clinical reliability and invasiveness, PVR > 150 ml during free-flowmetry is appropriate for the diagnosis of MSA with regard to urological dysfunction.

The present study might confirm that urinary voiding dysfunction as evaluated by measuring PVR is more useful than the presence of storage dysfunction in differentiating MSA from PD. The present result also indicated that the prevalence of DO is not different between PD and MSA, which was consistent with our previous study [3]. Although we have also previously reported that neurogenic change in EAS-EMG suggest the diagnosis of MSA rather than PD [2], the present study indicated that PVR is more useful than EAS-EMG in differentiating MSA from PD.

Concluding message

The present study indicated that PVR larger than 150 ml might be more useful than other UDS parameters in differentiating MSA from PD.

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Disclosures

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