

# Association of urodynamic findings in new onset multiple sclerosis with subsequent occurrence of urinary symptoms and acute episode of disease in females

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**Background:** The aim of the study was to determine the relative frequency of abnormal urodynamic findings in new multiple sclerosis (MS) cases without micturition complaints and to find its correlation with the number of MS plaques on magnetic resonance imaging (MRI), urinary tract involvement and the number of disease episodes. **Methods:** In this prospective study, 50 new female case of multiple sclerosis were enrolled. Age, urodynamic findings, micturition complaints and number of plaques on MRI were recorded on admission. Occurrence of urinary symptoms and number of episodes of the disease were recorded every three months during one-year follow-up. **Results:** The mean patients' age was  $32.4 \pm 7.2$  years and all patients were female. Of the 50 patients, 19 (38%) had a normal urodynamic test and 31 (62%) had abnormal urodynamic findings at the beginning of the study. The occurrence of micturition complaints during follow-up in patients with abnormal urodynamic findings (94%) was significantly higher ( $p < 0.0001$ ) than patients with normal urodynamic findings (37%). In addition, the number of plaques on MRI at the beginning of the study in patients with abnormal urodynamic finding was significantly higher ( $p < 0.004$ ) compared to patients with a normal urodynamic study. The number of episodes during follow-up was not statistically different between patients with normal and abnormal urodynamic findings ( $p = 0.46$ ).

**Conclusions:** According to this study, 62% of all new MS patients had an abnormal urodynamic test. This is a considerable proportion of patients and it seems urodynamic studies can be used when MS is first diagnosed.

**Key words:** Multiple Sclerosis, Urodynamic Test, Urinary Complaints, Plaques

## INTRODUCTION

Multiple sclerosis (MS) is the most common debilitating neurologic disease that affects 2.5 million people all over the world with various patterns such as primary progressive, relapsing-remitting, or secondary progressive.<sup>[1-3]</sup> It is a progressive, chronic inflammatory, demyelinating disease of the central nervous system that can result in a wide range of disabilities.<sup>[4]</sup> Most MS patients experience some sexual, bladder, and/or bowel dysfunction during the course of the disease.<sup>[5]</sup> Voiding dysfunction, which is one of the most common manifestations of MS (occurring in more than 90% of patients), may be due to detrusor overactivity with striated sphincter synergia, detrusor overactivity with striated sphincter dyssynergia, and detrusor areflexia.<sup>[6]</sup>

Urodynamic studies are indicated in patients with neurogenic bladder symptoms. Although they are

not considered as a first-line diagnostic test in MS, some studies have shown bladder dysfunction and abnormal urodynamic findings in 50% of MS patients even in the absence of micturition complaints.<sup>[9]</sup> Bladder involvement may thus exist, although subclinically and for a long time before patients develop urinary symptoms. Thus, urodynamic studies might be able to identify patients at higher risk of voiding dysfunction.<sup>[10-13]</sup> In this study, we assessed positive urodynamic test in new MS cases without micturition complaints and tried to find its association with future urinary tract involvement and the number of MS plaques on MRI.

## METHODS

This prospective study was performed on 50 new female cases of MS between April 1, 2010, and April 1, 2011. Patients from the MS Clinic at Al-Zahra University Hospital in Isfahan were enrolled in the

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study using convenience-sampling method. In all cases, the diagnosis of MS was established by McDonald criteria.<sup>[14]</sup> The MRI images of all patients were studied by a neurologist and the number of plaques was determined. None of participants had urinary symptoms such as urgency, straining, urinary frequency, nocturia, hesitancy, interrupted voiding, or incomplete emptying. None of subjects had a history of any disease that could affect the urodynamic test results, e.g. Parkinson's disease, spinal cord injury, stroke, diabetes or a history of central nervous system dysfunction other than MS. Patient who did not complete the study were excluded. We obtained ethics committee approval for the trial from the school of medicine in Isfahan University of medical sciences. All patients were informed of the purpose of the study and written consent was obtained.

Age, urodynamic findings and number of plaques on MRI were recorded at the beginning of the study. Data about the occurrence of urinary symptoms and the number of disease episodes were collected every three months for 1 year. Eligible patients were referred for urodynamic evaluation with Labori-Benito urodynamic system at a specialized clinic at the beginning of the study. Simultaneous cystometry and sphincter electromyography were performed with the patient in the supine position and voiding cystometry was then performed in the sitting position. Electromyography was recorded using a coaxial needle electrode inserted transperineally into the perianal striated muscle. Post-void residual urine volume, volume at first desire to void, maximum cystometric capacity, maximum detrusor pressure during the filling and voiding phases, and uninhibited bladder contractions (if present) were recorded as urodynamic parameters. Patients with either of three types of abnormal test results were marked as patient with abnormal urodynamic findings. Type 1 was detrusor overactivity (uninhibited bladder contractions during filling cystometry) with striated sphincter synergia. Type 2 was detrusor overactivity with striated sphincter dyssynergia and type 3 was detrusor areflexia. During follow-up, patients were assessed every 3 months by a urologist using a standardized questionnaire (Urinary Distress Inventory - UDI) to determine the occurrence of urinary complaints<sup>[15]</sup> and by a neurologist to determine the number of disease episodes.

Statistical analysis was performed with SPSS software (version 16). All data are presented as means  $\pm$  standard deviation (SD), number (%) or median (Inter Quartile Range). The Pearson chi-square, Fisher's exact

test, Independent sample t-test and Mann-Whitney test were used to compare between patients with normal and abnormal urodynamic findings. Statistical significance was accepted at  $P < 0.05$ , two-tailed.

## Results

All 50 patients enrolled in this study were included in the final analysis. The mean age of the patients was  $32.4 \pm 7.2$  years. Nineteen patients (38%) had normal urodynamic findings and 31 patients (62%) had abnormal urodynamic findings. In the latter group, urodynamic evaluation revealed detrusor overactivity with striated sphincter synergia in 17 patients (55%), detrusor overactivity with striated sphincter dyssynergia in 8 patients (26%), and detrusor areflexia in 6 patients (19%). The mean age was not statistically different between patients with normal and abnormal urodynamic findings ( $31.1 \pm 6.8$  vs.  $33.7 \pm 7.2$  years, respectively;  $p = 0.34$ ).

We found that patients who had abnormal urodynamic findings at the beginning of the study showed a high incidence of micturition complaints during follow up (29 of 31 patients, 94%) compared with patients with normal urodynamic findings (7 of 19 patients, 37%), a difference which was statistically significant ( $p < 0.0001$ ). Table 1 shows the frequency and the kind of micturition complaints that occurred during follow-up and the number of plaques on MRI in our patients. Significant differences were observed in the number of plaques between patients with normal and abnormal urodynamic findings ( $p = 0.004$ ). Urinary symptoms were detected at the third and fourth visits (a median of 10 months from the initial diagnosis of multiple sclerosis.)

The majority of patients with either normal or abnormal urodynamic findings (89.5% and 80.6%, respectively) had one episode during 1-year follow-up. Two episodes of attacks occurred in 2 patients (10.5%) of the group with normal urodynamic test results and in 6 patients (19.4%) of the group with abnormal urodynamic test findings. However, this difference was statistically insignificant ( $p = 0.46$ ).

## Discussion

Voiding dysfunction is very common in patients with Multiple Sclerosis. Different studies have reported the incidence of voiding dysfunction in these patients to be from 75% to 90%.<sup>[1,4]</sup> Bemelmans et al. showed that 50 percent of patients with MS had abnormal urodynamic test results implying bladder dysfunction even in the absence of micturition complaints.<sup>[13]</sup> According to our

**Table 1. Micturition complaints and number of plaques in MRI in 50 patients with multiple sclerosis**

	Urodynamic findings		P-value
	Normal (n=19)	Abnormal (n=31)	
Micturition complaints			
No	12 (63)	2 (6.5)	< 0.0001*
Retention	1(5.4)	9 (29)	
Urgency	4 (21.1)	18 (58)	
Frequency + Urgency	2 (10.5)	2 (6.5)	
Number of Plaques	10 [9-12]	13 [12-14]	0.004 <sup>†</sup>
Number of episodes	0 or 1 episodes	25 (80.6)	0.46 <sup>††</sup>
	2 episodes	2 (10.5)	6 (19.4)

Data presented as number (%) and median [IQR].

P-values calculated with chi-square\*, Mann Whitney<sup>†</sup> and Fisher's exact test.<sup>††</sup>

study, 62% of all new MS cases without urinary symptom had an abnormal urodynamic test. The surprisingly high (94%) incidence of micturition complaints during one-year follow up in patients with abnormal test results in our study indicates the predictive power of urodynamic studies and the importance of early diagnosis of bladder dysfunction in these patients, because a multifaceted individualized bladder rehabilitation program reduces disability and improves quality of life.<sup>[16]</sup>

The type of bladder dysfunction varies from an overactive bladder to a poorly emptying bladder, or a combination of both.<sup>[4]</sup> Detrusor overactivity with or without detrusor-sphincter dyssynergia was shown in 81% of patients with abnormal urodynamic test in our study which is similar to the findings of a study by Olan et al. (75%). It thus seems that overactivity is a more common type of voiding dysfunction than detrusor areflexia. In some studies, no association was found between urodynamic diagnosis and upper tract deterioration and urinary symptom scores.<sup>[17]</sup> Nakipoglu et al., for example, found no significant correlation between urinary symptoms and urodynamic abnormalities and between urinary complications and urodynamic findings.<sup>[18]</sup> In comparison with our study, we found a higher incidence of micturition complaints in patients with abnormal urodynamic tests ( $p < 0.0001$ ).

As shown in the results, there was a significant difference in the number of plaques between the two groups (patients with normal and abnormal urodynamic test findings). It thus seems that new cases of multiple sclerosis with more plaques on MRI are at higher risk of developing urinary complications during the course of the disease. There was, however, no difference in the number of episodes of attacks in the two groups,

suggesting that urodynamic studies cannot predict the clinical course of the disease.

## Conclusion

According to this study, 62% of all new MS patients had an abnormal urodynamic test. This is a considerable proportion of patients and it therefore seems that urodynamic studies can be used as a useful diagnostic test when MS is first diagnosed. On the other hand, the majority of patients with abnormal urodynamic finding show urinary symptoms during one-year follow-up, suggesting that this group of MS patients should be also visited by an urologist during the course of the disease. However, further studies are warranted.

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## REFERENCES

- Poser CM. The dissemination of multiple sclerosis: a Viking saga? A historical essay. *Ann Neurol* 1994; 36 Suppl 2: S231-S243.
- Stephen LH, Douglas SG. Multiple sclerosis and other demyelinating disease. In: Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, et al, editors. *Harrison's Principles of Internal Medicine*. 17<sup>th</sup> ed. New York: McGraw-Hill; 2008. p. 2611-21.
- Simon R, Greenberg D, Aminoff M. Motor deficits. In: Simon R, Greenberg D, Aminoff M, editors. *Clinical Neurology*. 5<sup>th</sup> ed. New York: McGraw-Hill; 2002. p. 167-70.
- Seth HJ, Panicker NJ, Fowler JC. Bladder dysfunction in multiple sclerosis. *Int J Clin Rev* 2011; 3(1): 11-15
- Nortvedt MW, Riise T, Frugard J, Mohn J, Bakke A, Skar AB, et al. Prevalence of bladder, bowel and sexual problems among multiple sclerosis patients two to five years after diagnosis. *Mult Scler* 2007; 13(1): 106-12.

6. Wein AJ. Lower urinary tract dysfunction in neurologic injury and disease. In: Wein A, Kavoussi L, Novick A, Partin A, Peters C, et al, editors. *Campbell-Walsh Urology*. 9<sup>th</sup> ed. Philadelphia: Saunders; 2006. P. 2019-31.
7. Raviv G, Shefi S, Nizani D, Achiron A. Effect of craniosacral therapy on lower urinary tract signs and symptoms in multiple sclerosis. *Complement Ther Clin Pract* 2009; 15(2): 72-5.
8. Thompson AJ, Toosy AT, Ciccarelli O. Pharmacological management of symptoms in multiple sclerosis: current approaches and future directions. *Lancet Neurol* 2010; 9(12): 1182-99.
9. Bemelmans BL, Hommes OR, Van Kerrebroeck PE, Lemmens WA, Doesburg WH, Debruyne FM. Evidence for early lower urinary tract dysfunction in clinically silent multiple sclerosis. *J Urol* 1991; 145(6): 1219-24.
10. Ozawa H, Watanabe T, Uematsu K, Sasaki K, Inoue M, Kumon H. Use of Doppler ultrasound for non-invasive urodynamic diagnosis. *Indian J Urol* 2009; 25(1): 110-5.
11. Kelly CE, Krane RJ. Current concepts and controversies in urodynamics. *Curr Urol Rep* 2000; 1(3): 217-26.
12. Karsenty G, Coquet-Reinier B, Elzayat E, Lemieux MC, Corcos J. P-Mate, a new device allowing women to urinate in the standing position: urodynamic and satisfaction assessment. *Int Urogynecol J Pelvic Floor Dysfunct* 2008; 19(6): 823-6.
13. Errando SC, Batista Miranda JE, Granda CM, Puigpelat FT, Arano BP, Rodriguez JV, et al. Complete urodynamic office evaluation; a method for the delivery of health care. *Actas Urol Esp* 1998; 22(5): 401-4.
14. Lublin FD, Miller AE. Multiple sclerosis and other inflammatory demyelinating diseases of the central nervous system. In: Bradley WG, Daroff RB, Fenichel GM, Jankovic J, editors. *Neurology in Clinical Practice*. 5<sup>th</sup> ed. London: Butterworth-Heinemann; 2007.p.1583-1618.
15. Harvey MA, Kristjansson B, Griffith D, Versi E. The Incontinence Impact Questionnaire and the Urogenital Distress Inventory: a revisit of their validity in women without a urodynamic diagnosis. *Am J Obstet Gynecol* 2001; 185(1): 25-31.
16. Khan F, Pallant JF, Pallant JI, Brand C, Kilpatrick TJ. A randomised controlled trial: outcomes of bladder rehabilitation in persons with multiple sclerosis. *J Neurol Neurosurg Psychiatry* 2010; 81(9): 1033-8.
17. Onal B, Siva A, Buldu I, Demirkesen O, Cetinel B. Voiding dysfunction due to multiple sclerosis: a large scale retrospective analysis. *Int Braz J Urol* 2009; 35(3): 326-33.
18. Nakipoglu GF, Kaya AZ, Orhan G, Tezen O, Tunc H, Ozgirgin N, et al. Urinary dysfunction in multiple sclerosis. *J Clin Neurosci* 2009; 16(10): 1321-4.

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