

Urodynamic abnormalities in patients with relapsing remitting multiple sclerosis

ABSTRACT:

Objectives: The aim of this study is to evaluate the urodynamic detected bladder dysfunction in relapsing remitting Multiple Sclerosis patients with mild or without lower urinary tract symptoms.

Material and methods: This a prospective study for 32 patients with relapsing remitting Multiple Sclerosis from January 2017 to June 2018. Inclusion criteria were patients with mild or without lower urinary tract symptoms and mild disability. Urodynamic studies were performed for all patients with recording: cystometric capacity; detrusor overactivity; bladder compliance and voiding parameters as detrusor underactivity or detrusor external sphincter dyssynergia.

Results: Urodynamic abnormalities were detected in 22 patients (69%). Detrusor overactivity (DO) was the most prevalent either alone in 8 patients (25%); combined with detrusor external sphincter dyssynergia in 8 patients (25%); DO with low compliant bladder and impaired contractility in another 4 patients (13%) DO with low complaint bladder in 2 patients (6%). Bladder dysfunction was statistically significant associated to high disability score; longer duration of illness; and frequent number of attacks and the presence of lower urinary tract symptoms.

Conclusion: Urodynamic abnormalities were found in 69% of our patients. This highlight the importance of urodynamic in early evaluation of relapsing remitting Multiple Sclerosis.

Keywords: Urodynamic; Bladder dysfunction; Multiple Sclerosis.

Introduction

Multiple sclerosis (MS) is a chronic immune-mediated inflammatory disease of the central nervous system. It affects mostly young adults with frequency 3-4 times more in females than males. The exact etiology of MS is still unknown with possible genetic and environmental influences [1,2].

MS is a disease with a wide variability in clinical presentation. The course can be intermittent or chronic. The presentation can start by visual disturbances; weakness of extremities; gait problems; fecal and/or urinary manifestations. Bladder dysfunctions are very common in MS patients with incidence ranging from 50% to 97%. The demyelinated plaques in the brain or spinal cord can disrupt the transmission of signals between the brain and urinary system [3].

Normal bladder function is mandatory for preservation of kidney function; prevention of infection; personal independence; self-confidence and overall quality of life. Untreated bladder issues can cause worsening of other MS symptoms, such as weakness and spasticity. Also, repeated bladder or urinary tract infections (UTI); renal stones; upper urinary tract deterioration and compromise overall health [4,5]. Moreover, several studies found increased risk of exacerbation around the time of UTI and that infection-related relapses were associated with more sustained neurological deficits and worse quality of life [4,5].

The evaluation of bladder function is by bladder diary; abdominal ultrasonography with determination of post void residual urine volume and urodynamic study (UDS). Urodynamic is used to characterize the nature of bladder dysfunction and to predict the risk factors for possible upper urinary tract deterioration. In addition, UDS is essential for proper therapeutic planning. The discrepancy between the symptoms and the objective signs detected by UDS raise the need to put this evaluation method as a mandatory initial investigation in MS patients [6,7].

Unfortunately, UDS are not routinely requested for early evaluation in patients with MS, because UDS do not belong to a neurologist's field of diagnosis; most patients tend to keep silent about their urinary symptoms and finally it is difficult to perform urodynamic examination in all MS patients especially those with no lower urinary tract symptoms (LUTS) [8]. This delay in bladder evaluation may lead to deficit in management.

Few studies have investigated the relationship between subjective urinary complaints and urodynamic parameters in MS patients with different results [6,9,10]. The aim of this study is to evaluate the urodynamic detected bladder dysfunction in relapsing remitting MS patients with mild or without LUTS.

Patients and methods:

Patients

This is a prospective study for 32 patients with definite diagnosis of relapsing remitting MS who referred to the neurology department, Sohag university hospital from January 2017 to June 2018. Patients were included in the study if they have no or mild LUTS. Exclusion criteria were defined as follows: patients with progressive MS; patients with relapse at the time of investigation; patients with urinary incontinence; catheterized patients; severe disability with Expanded Disability Status scale (EDSS) more than 6.5 or lack of ability to communicate.

Patients evaluation:

Patients who met the criteria were recruited to urodynamic unit, Sohag university hospitals for assessment of their bladder function. The examination included dip stick urinalysis to exclude infection at the time of examination. Urodynamic measurement was done according to ICS-standard (It was done in sitting position with filling the bladder by 6 or 7 French double lumen pressure catheters with 37⁰ C physiological saline, the filling rate was 10 to 20 ml/min) and was performed by same physician and the same nurse [11].

Evaluated parameters were: Cystometric capacity, presence of detrusor overactivity with or without external sphincter dyssynergia (DESD), bladder compliance, detrusor underactivity and post void residual urine volume.

Statistical analysis

Data was analyzed using SPSS version 24. Quantitative data was represented as mean, standard deviation, median and range. Data was analyzed using Mann-Whitney test. Qualitative data was presented as number and percentage and compared using either Chi square test or fisher exact test. P value was considered significant if it was less than 0.05.

Results:

Baseline data:

Our study included 32 patients with relapsing remitting Multiple sclerosis (MS), 75% of them were females. The mean age was 32 ± 4.8 years with median age 33 (22 -39) years. LUTS were reported in 37.5% of our patients and were irritative symptoms (increased frequency and urgency) (table 1).

Regarding the neurological data, the median age of onset of MS was 28 (17 -36) years and the median duration of symptoms was 3 (1-9) years. Our patients had mild to moderate disability with median EDSS score 4.5 (1-6). Physical activity was preserved in 75 % of our patients with 25% had an assisted mobility (Table2).

Clinical data:

On urodynamic evaluation, 10 patients were free (31%) and 22 patients (69%) had urodynamic abnormalities. Detrusor overactivity (DO) was the most prevalent either alone in 8 patients (25%); combined with detrusor external sphincter dyssynergia (DESD) in 8 patients (25%); DO with low compliant bladder and impaired contractility in another 4 patients (13%) DO with low complaint bladder in 2 patients (6%) (Figure 1).

The median cystometric capacity of our patients was 350 (200 – 400) ml. The most frequent urodynamic abnormalities were detrusor overactivity in 22 patients (69.7%) followed by low compliant bladder in 14 patients (34.7%). DESD was found in 25%. The median post void residual urine was 50 (20 -150) ml (Table 3).

Detrusor overactivity was linked to high disability score (EDSS), longer duration of illness and frequent number of attacks and these factors were statistically significant (Table 4).

All urodynamic abnormalities were more common in patients with LUTS, and this was highly statistically significant (Table 5).

Discussion:

The bladder, urethra and external sphincter act as a functional unit for lower urinary tract. Their basic function is to store the urine with low intravesical pressure and to evacuate it voluntary if the conditions are suitable. This function depends on the intact communication between the sacral spinal micturition center and higher brain centers. Interruption of this communication leads to bladder dysfunction and a possible risk on the upper urinary tract and patient's quality of life [3].

Our study included homogenous group of relapsing remitting MS. Female to male ratio was 3:1 and this was comparable to other studies that reported predominance of MS in females [3,12]. In literature,

urodynamic abnormalities in MS patients were linked to more severe LUTS and MS types other than relapsing remitting [8]. Thus, we choose this group of patients (relapsing remitting MS without or with mild LUTS) to study their bladder function.

LUTS were reported on 37.5 % of our patients' group, which is far less than reported in the literature. However, this caused by removing patients with incontinence; progressive MS and moderate to severe LUTS from our study. In other studies, more than 50% of relapsing remitting MS suffered moderate to severe LUTS which was more than LUTS reported in progressive MS [13,14]. This can be attributed to more adaptation to the symptoms in progressive MS and more cognitive impairment [15].

The incidence of urodynamic abnormalities in our study was 69% which was less than reported in literature. This can be explained by the fact that 62.5% of our patients had no LUTS. However, the most common reported abnormality was DO with or without DESD. This was consistent with other studies [8,13,16]. This can be explained by the modern concept of neural control of the bladder which depends on afferent and efferent reflexes between the sacral micturition centre and pontine micturition center. Interruption of these reflexes and pathways by spinal cord lesions in MS leads to detrusor overactivity with or with coordinated sphincter, which depends on the level of the lesion [3,17].

The frequency of DESD in our study was 25%. The reported frequency of DESD in MS patients range from 18% to 66% [18]. DESD is associated with risk to the upper urinary tract due to incomplete bladder emptying with possible reflux. This emphasis the importance of detecting this abnormality early to avoid possible complications [19].

We studied the risk factors of urodynamic abnormalities in our patients and found that the presence of LUTS; high EDSS score; longer duration of illness and the numbers of attacks were statistically significant risk factors. The higher EDSS score was reported in another study as a risk factor [17]. This could be explained by damage to the pontine tegmentum and spinal cord which induces bladder overactivity by reducing the parasympathetic inhibition that normally allows the bladder to fill. The severity of LUTS and wheel chair dependency were reported as a risk factors in another study [8].

Gender was not found to be a risk factor for urodynamic abnormalities and this was in accordance with literature. However, female gender was associated with more urinary tract symptoms [20].

Urodynamic is essential for proper study of the bladder function and for therapeutic planning. It helps us to detect the risk factors for upper urinary tract deterioration. Some authors reported poor correlation between symptoms and objective bladder dysfunction [6,7]. Therefore, UDS are recommended as routine tests for evaluation of bladder dysfunction or function in patients with relapsing remitting MS [21].

Our study was limited by the small sample size. The prospective nature of the study and homogenous patients' group could be considered as advantages. To our knowledge, this was the first study that examine the bladder function in patients without LUTS or with mild symptoms.

Conclusion: Urodynamic abnormalities were found in 69% of our relapsing remitting MS with mild disability and mild LUTS. The presence of LUTS; higher EDSS score; longer duration of MS and frequent attacks could be considered as risk factors for bladder dysfunction. This highlights the importance of urodynamic in early evaluation of relapsing remitting Multiple Sclerosis.

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Variable	Patients N=32
Age/years	
Mean \pm SD	32 \pm 4.8
Median (range)	33 (22-39)
Gender	
Man	8 (25%)
Women	24 (75%)
Associated disease	
Non	28 (87.5%)
Diabetic	4 (12.50%)
Bladder symptoms	
Yes	12 (37.5%)
No	20 (62.5%)

Table (1): Baseline sociodemographic data.

Variable	Patients N=32
Age of onset/years	
Mean \pm SD	27.3 \pm 5.6
Median (range)	28 (17-36)
Time between onset and diagnosis/months	
Mean \pm SD	13 \pm 12
Median (range)	10.5 (1-36)
Duration of illness/years	
Mean \pm SD	4 \pm 2.6
Median (range)	3 (1-9)
Total number of attacks	
Mean \pm SD	3 \pm 1.5
Median (range)	3 (1-6)
EDSS score	
Mean \pm SD	4.2 \pm 1.5
Median (range)	4.5 (1-6)
Physical activity	
Ambulant	24 (75%)
Assisted	8 (25%)

Table (2): Clinical criteria of MS patients.

EDSS; Expanded Disability Status scale)

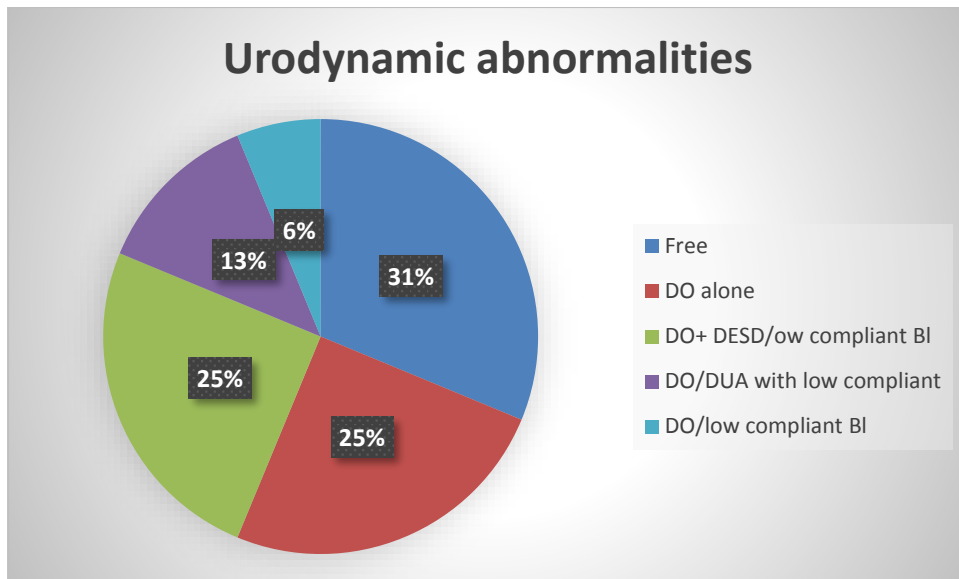


Figure (1): Urodynamic abnormalities in MS patients.

DO= detrusor overactivity; DESD= detrusor external sphincter dyssynergia; DUA= detrusor underactivity

Variable	Patients N=32
Cystometric capacity/ml	
Mean \pm SD	325 \pm 64.8
Median (range)	350 (200-400)
Detrusor overactivity/number and percentage	
Yes	22 (68.75%)
No	10 (31.25%)
DESD/number and percentage	
Yes	8(25%)
No	24 (75%)
Low compliance/number and percentage	
Yes	14 (34.75%)
No	18 (56.25%)
PVR/ml	
Mean \pm SD	62 \pm 39
Median (range)	50 (20-150)
Detrusor underactivity/number and percentage	
Yes	4 (12.5%)
No	28 (87.5%)

Table (3): Urodynamic abnormalities in MS patients.

DESD= detrusor external sphincter dyssynergia; DUA= detrusor underactivity

PVR= Post void residual urine

Variable	DO present	DO absent	P value
Gender			
Male	6	2	1
Female	16	8	
Age/years			
Mean \pm SD	33 \pm 4	29.6 \pm 5.2	0.07
Median (range)	33 (26-39)	29 (33-35)	
Age of onset/years			
Mean \pm SD	27.4 \pm 6	27 \pm 5	1
Median (range)	29 (17-63)	27 (20-33)	
Duration of illness/years			
Mean \pm SD	5 \pm 2.8	2.4 \pm 0.5	0.01
Median (range)	5 (1-9)	2 (2-3)	
Time between attacks/months			
Mean \pm SD	15.3 \pm 13	8.4 \pm 9.3	0.15
Median (range)	12 (1-36)	4 (1-24)	
EDSS			
Mean \pm SD	5 \pm 1	2.6 \pm 1	0.0001
Median (range)	5 (3-6)	3 (1-4)	
Number of attacks			
Mean \pm SD	3.5 \pm 1.6	2.2 \pm 0.4	0.01
Median (range)	3 (1-6)	2 (2-3)	

Table (4): Predictive factors of detrusor overactivity (DO).

Variable	LUTS present	LUTS absent	P value
Detrusor overactivity			
Yes	12	10	0.004
No	0	10	
DESD			
Yes	8	0	<0.0001
No	4	20	
Low compliant bladder			
Yes	12	2	<0.0001
No	0	18	
DUA			
Yes	4	0	0.01
No	8	20	

Table (5): Association between urodynamic abnormalities and LUTS.

DO= detrusor overactivity; DESD= detrusor external sphincter dyssynergia; DUA= detrusor underactivity