

Urodynamic Assessment in Postmenopausal Women

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Lower urinary tract (LUT) symptoms are not uncommon in postmenopausal Myanmar women. The aim of the study was to study the urodynamic assessment in postmenopausal women. A cross-sectional, analytical study was conducted to eligible 114 postmenopausal women (81 symptomatic women and 33 asymptomatic women) attending at Gynaecological Out-patient Department of Central Women's Hospital (Yangon) from October 2012 to June 2014. Examination included body mass index (BMI), vaginal examination, cough test, and 1 hour pad test. Urine RE was done to all patients to exclude urinary tract infection. Urodynamic investigation was done in those patients who had no urinary tract infection and it was carried out at Urosurgical Ward of No. 2 Military Hospital, Yangon. The most frequent symptom among the study population was urinary incontinence (50%) followed by urgency (45.6%), night time frequency (38.6%). Symptom-based clinical diagnosis of study population were: stress urinary incontinence (SUI) in 9.6%, urgency urinary incontinence (UUI) in 4.9%, mixed urinary incontinence (MUI) in 25.4%, overactive bladder (OAB) in 16.7%, and voiding problem in 28.9% of study population. Regarding the urodynamic diagnosis, 47 patients had normal urodynamic findings and 20 patients were found to have urodynamic stress incontinence (USI). Five patients had urodynamic evidence of detrusor overactivity (DO). Mixed type of USI and DO was found in 10 patients. Forty patients had objective evidence of voiding dysfunction. There is no statistically significant association between duration of menopause and urodynamic parameters of postmenopausal women except strong desire to void. ($p=0.044$). Urodynamic investigations help postmenopausal women with LUTS in getting correct diagnosis and formulating a treatment plan especially surgical treatment is considered.

Key words:

INTRODUCTION

Menopause is the time in a woman's life when her periods stop. Estrogen deficiency becomes clinically more overt over time and is associated with a number of LUT symptoms. These include frequency, nocturia, urinary incontinence (UI), urinary tract infection (UTI), and urgency.¹ Urogenital symptoms are not uncommon in Myanmar postmenopausal women.^{2,3} Female lower

urinary tract symptoms are nonspecific, and a thorough clinical evaluation is required to establish the correct diagnosis. Urodynamic is a useful tool in evaluation of LUT dysfunction because it can reproduce the patient's symptoms, and provide a pathophysiological explanation or the patient's

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complaints. Thus it is considered as gold standard for the diagnosis of bladder outlet obstruction (BOO) and urinary incontinence.⁴ It can also predict outcome after therapeutic intervention. However, there are several important parameters, such as age, sex, and body mass index, and menopausal status which affect urodynamic values, rendering it more challenging to precisely define normality from tests performed on patients.⁵ The present study was done with the objectives of: to determine the proportion of lower urinary tract symptoms in postmenopausal women who agreed to undergo urodynamic investigation, to find out symptom-based clinical diagnosis of lower urinary tract symptoms among study population, to find out urodynamic based diagnosis of lower urinary tract symptoms among study population, to find out the relationship between symptoms based clinical diagnosis and urodynamic diagnosis of lower urinary tract symptoms in postmenopausal women, and to assess the association of urodynamic parameters to duration of menopause.

MATERIALS AND METHODS

This study was a cross-sectional, analytical study. It was carried out at Gynecological Out-patient Department of Central women's Hospital (Yangon) and Urosurgical Unit of No. 2 Military Hospital (Yangon) from October 2012 to September 2014. Eligible 114 postmenopausal women (81 symptomatic women and 33 asymptomatic women) were studied. Lower urinary tract symptoms and other relevant history were taken. Examination included body mass index (BMI), vaginal examination, cough test, and 1 hour pad test. Three-day bladder diary was filled up by patients and urinary tract infection was excluded before urodynamic investigation.

Urodynamic investigation was carried out at Urosurgical Ward of No. 2 Military Hospital, Yangon. The investigation was performed according to good urodynamic practice.⁶ Uroflowmetry was done after

ensuring adequate bladder volume which was checked by transabdominal ultrasound. The uroflow parameters such as average flow rate, maximum flow rate, voiding time and voided volume, residual urine were measured. Under aseptic measure, 8-Fr double-lumen urethral catheter was introduced into bladder to measure vesical pressure (pves) and rectal balloon catheter was inserted into the rectum to measure abdominal pressure (pabd). Then filling cystometry was proceeded.

The bladder was filled with normal saline with the filling rate of 50 ml/min. First sensation of filling, first desire to void, strong desire to void, capacity, compliance and the presence or absence of involuntary detrusor contractions during filling phase were noted. Provocative manoeuvres such as valsalva, supine cough, standing cough and hand washing were performed to detect incontinence and detrusor over activity (DO). Then, pressure flow study was conducted while the patient sat on commode which was connected with uroflowmeter. Urodynamic diagnosis was made according to International Continence Society definitions.⁷

The data was analyzed with independent 't' test. ANOVA test was used for group statistics. For categorical data, the differences in proportions were analyzed with χ^2 test or Fisher's exact test where appropriate. The level of significance was set at 0.05. Data analysis was done by using STATA version 11.0 software. The test properties of relationship between symptom-based clinical diagnosis and urodynamic diagnosis was analyzed by χ^2 test and p value. The sensitivity, specificity, positive and negative predictive value of symptom-based clinical diagnosis was also calculated.

RESULTS

The age of study population ranged from 44 to 82 years with mean (\pm SD) age of 58.14 (\pm 9.6) years. The most frequent symptom among the study population was

urinary incontinence (50%) followed by urgency (45.6%), night time frequency (38.6%) and day time frequency (35.1%). Among various types of incontinence mixed urinary incontinence was most common form. Incomplete emptying was the most common complaint among various voiding problems. Symptom-based clinical diagnosis of study population were: stress urinary incontinence (SUI) in 9.6%, urgency urinary incontinence (UUI) in 14.9%, mixed urinary incontinence (MUI) in 25.4%, overactive bladder (OAB) in 16.7% and voiding problem in 28.9% of study population (Table 1).

Table 1. Symptom-based clinical diagnosis in study population (n=114)

Symptom-based clinical diagnosis	No.	%	95% CI
<i>Asymptomatic</i>	33	28.9	20.8,38.2
<i>Stress urinary incontinence (SUI)</i> SUI=10 SUI with voiding problem=1	11	9.6	4.9, 16.6
<i>Urgency urinary incontinence (UUI)</i> UUI with voiding problem=4 OAB with UUI (OAB wet)=11 OAB with MUI=2	17	14.9	8.9, 22.8
<i>Mixed urinary incontinence (MUI)</i> MUI=20 MUI with voiding=6 MUI with OAB=2 MUI, OAB with Voiding problem=1	29	25.4	17.7,34.4
<i>Overactive bladder (OAB)</i> OAB (dry)=4 OAB with UUI (OAB wet)=11 OAB with MUI (OAB wet)=2 OAB with voiding=2	19	16.7	10.3,24.8
<i>Voiding problem</i> Voiding problem =19 Voiding problem with UI=12 Voiding problem with others=2	33	28.9	20.8,38.2

*Combination of diagnosis is possible

The urodynamic diagnosis of study population is shown in Table 2. Forty-seven patients had normal urodynamic findings. Twenty patients were found to have urodynamic stress incontinence (USI) (Fig. 1).

Five patients had urodynamic evidence of detrusor overactivity (DO). Mixed type of USI and DO was found in 10 patients. Forty patients had objective evidence of voiding dysfunction. Among them, 37 patients had bladder outlet obstruction (BOO), 1 patient had voiding dysfunction due to abnormal detrusor function and 2 cases were due to unspecified cause. Two cases out of total

Table 2. Urodynamic diagnosis in study population (n=114)

Urodynamic diagnosis	Case (n)		Total (=114)
	Asymptomatic (33)	Symptomatic (81)	
Normal	25		47
USI	-	20	20
DO	1	4	5
Mixed USI & DO		10	10
Voiding dysfunction due to BOO	6		6
BOO with other diagnosis	-	21	27
Voiding dysfunction due to abnormal detrusor function	-	10	10
Voiding dysfunction due to unspecified causes	-	1	1
Voiding dysfunction due to unspecified causes	-	2	2
Others (low capacity and low compliance)	1	1	2

*Combination of diagnosis is possible

USI=Urodynamic stress incontinence

DO= Detrusor overactivity

BOO=Bladder outlet obstruction

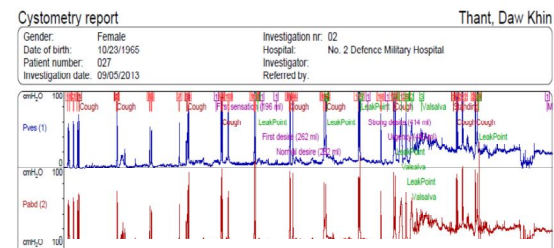


Fig. 1. Cystometry of patient with urodynamic stress incontinence

Table 3. Urodynamic diagnosis in patient with symptom of urinary incontinence

Symptom of urinary incontinence	Urodynamic diagnosis				Total No.
	Pure USI	Pure DO	Mixed USI and DO	Normal	
	No. (%)	No. (%)	No. (%)	No. (%)	
SUI only	7(64)	-	1(9)	3(27)	11
UUI only	-	3(27)	-	14(82)	17
MUI	13(45)	1(3)	9(31)	6(21)	29

SUI= Stress urinary incontinence

UUI= Urgency urinary incontinence

MUI= Mixed urinary incontinence

114 postmenopausal women had other findings such as low capacity, low compliance. The urodynamic findings in postmenopausal women with urinary incontinence were summarized in Table 3. Among 11 patients who experienced only symptom of SUI, 7 patients (64%) had objective evidence of pure urodynamic stress incontinence (USI). Seventeen patients had only symptom of UUI. Among them

3 patients (7%) showed pure DO and the rest 14 (82%) of the patients had normal findings in urodynamics. The patients with symptom of MUI were 29 in total. Among them, 19 patients (31%) expressed urodynamics mixed USI and DO. There was no objective abnormality in the rest 6 patients (21%).

The sensitivity, specificity, positive predictive value, negative predictive value of clinical diagnosis of SUI in detecting urodynamic stress incontinence were 35%, 95.7%, 63.6% and 87.4%, respectively. For the clinical diagnosis of urge incontinence in detecting detrusor over-activity, sensitivity was 60% and specificity was 87.2%. It has a very low positive predictive value (17.6%) but high negative predictive value (99%).

For clinical diagnosis of overactive bladder in detecting DO, sensitivity was 80% and specificity was 86.2%. The sensitivity and specificity of clinical diagnosis of MUI in getting objective evidence were 90% and 80%, respectively. The positive and negative predictive values in detecting DO were 21.1% and 98%, respectively. Clinical diagnoses of mixed urinary incontinence as compared with urodynamic diagnosis of mixed urinary incontinence showed sensitivity 90%, specificity 80.8%, positive predictive value 31% and negative predictive value 98.8%, respectively. For the clinical complaint of voiding problems, sensitivity was 57.5% and specificity was 86.5%. The positive and negative predictive values in detecting urodynamic evidence of voiding dysfunction were 69.7 and 79%, respectively.

Statistically significant relationship between urodynamic based diagnosis and symptom based clinical diagnosis was found in clinical diagnosis of SUI, UI, OAB, Mixed UI, and voiding problem in study population ($p < 0.05$). There is no statistically significant association between duration of menopause and urodynamic parameters of postmenopausal women except strong desire to void ($p = 0.044$).

DISCUSSION

Homma, *et al.*⁸ stated that women might present with one of lower urinary tract symptoms but usually the clinical scenario is complex due to clustered complains. The most frequent complaint in the present study was urinary incontinence (50%) and mixed urinary incontinence (MUI) was most common type of UI (50.9%). The rest was contributed by urgency urinary incontinence (29.8%) and stress urinary incontinence (19.3%). The result of present study is almost similar to that reported by Pandey, *et al.*⁹ in which the most prevalent complaint was mixed urinary incontinence (33.17%), followed by stress incontinence (31.68%) and only 13.37% complained of urge incontinence (OAB wet). However, the trend of various types of urinary incontinence in the present study was not consistent with reports of Jittima, *et al.*¹⁰ and Kirss, *et al.*¹¹ in which stress urinary incontinence (SUI) was most common form of UI. Stress Urinary Incontinence was detected in 58.3% of study population in the study of Jittima, *et al.*¹⁰ and 78.83% of study population in study of Kirss, *et al.*¹¹

The present study was a hospital-based study conducted on women attending at Gynaecological Out-patient Department for various reasons. In other studies, the recruited patients were from menopausal clinic or urogynae clinic of hospital or from community based setting. The difference in study population may affect the prevalence of lower urinary tract symptoms.

In literature, many researchers tried to develop standardized questionnaires to assess LUTS and symptom-based, clinical diagnosis is used in initial evaluation and treatment of these conditions. According to an epidemiologic survey carried out in 11 Asian countries, the overall prevalence of OAB was 53.1%. The most common presenting symptom of OAB was urgency (65.4%), while frequency was present in 55.4%. Twenty-one percent of the OAB population presented with incontinence,

giving a prevalence of 11.4% for urge incontinence.¹²

In the present study, 19 out of 114 postmenopausal women (16.7%) were diagnosed as OAB which was defined by 2002 International Continence Society (ICS) definition. In the current study, recruited patients were postmenopausal women attending to Gynaecological Out-patient Department. Other studies were epidemiology surveys using self administered questionnaires and conducted in premenopausal and postmenopausal women. This will explain the discrepancy between the results of different studies.

A group of researchers from Thailand studied 129 female patients with symptoms of urinary incontinence who were referred to Urology Clinic at Ramathibodi Hospital. Urodynamic tests revealed that 19% (25 of 129) had normal findings, 43% (55 of 129) had genuine SUI, and 19% (24 of 129) had DO. Twelve percent (16 of 129) of patients had mixed SUI and DO. Only 1.5% (2 of 129) had overflow incontinence.¹³ In the present study, urodynamic diagnosis were as follow: normal urodynamic findings in 47 patients, urodynamic stress incontinence (USI) in 20 patients, detrusor overactivity (DO) in 5 patients, mixed type of USI and DO in 10 patients and voiding dysfunction in 40 patients.

In the study of Pandey and colleagues, 3 cases of urodynamic stress incontinence (USI) and 2 cases of detrusor overactivity (DO) were found in 64 women with symptom of stress urinary incontinence. No objective abnormality was found in others. All 9 women who complained of urgency had normal urodynamic findings. Among 27 women with urgency incontinence, detrusor hyperactivity was detected in 8 patients, USI in 2 patients, urodynamic mixed urinary incontinence (MUI) in 2 patients and others had normal urodynamic findings. Among 53 out of 67 women with symptoms of MUI, only 2 patients had urodynamic mixed incontinence and others had normal urodynamic diagnosis. The

mean (\pm SD) age of study population was 62.71 ± 10.92 years and the majority (84.165%) was postmenopausal women. The researchers concluded that a poor correlation between symptoms and urodynamic diagnosis in cases of female urinary incontinence.⁹ It was stated that where stress incontinence is the only symptom reported, urodynamic stress incontinence is likely to be present in over 90% of cases.¹⁴

The history elicited by the patient is the most important in making the diagnosis and to initiate treatment when patient presented with urge urinary incontinence. There are no clinical tests to elicit it. With the help of urodynamic study, OAB can be diagnosed. It was found that only around a third of these patients (29.63%) and one fifth (19.40%) of those with mixed urinary incontinence showed detrusor activity.⁹

Regarding the sensitivity and specificity of stress urinary incontinence in detecting genuine SUI, Ubolrat and colleagues found that sensitivity was good (96.4%) and the specificity was low (25%). The sensitivity of urgency was good (83%) but the specificity for distinguishing between DO and genuine SUI patients was quite low (51%). Nearly 81% of patients who had mixed urodynamic findings had mixed symptoms. The symptoms of mixed urinary incontinence were also found in 89% and 83% of genuine SUI and DO, respectively. It was concluded that symptoms of mixed urinary incontinence cannot distinguish between types of urodynamic abnormality.¹³

In the present study, overall sensitivity of any kind of incontinence symptom and voiding problem in detecting urodynamic evidence of lower urinary tract dysfunction was low but specificity was high. However, there is no statistically significant association between duration of menopause and urodynamic parameters of postmenopausal women except strong desire to void. ($p=0.044$). In Sartori, *et al.*¹⁵ study, there was a decrease in maximum urine flow rate, voiding time, volume at which first desire to

void and increased in post void residual volume, as post menopausal duration progressed.¹⁵ Similarly, Diokno, *et al.*¹⁶ and Gillon, *et al.*¹⁷ proved that the maximum bladder capacity in postmenopausal women was reduced than that of the reproductive aged women. Based on the above studies, there is a reduction of various urodynamic parameters such as Q_{max} and maximum bladder capacity in postmenopausal women.

The results of the current study and data of other studies, indicated that urodynamic assessment may allow more precise evaluation of the patient with lower urinary tract symptoms especially for those with complex symptoms and those who have to undergo surgery in pelvic floor. However, there are limitations in the present study.

The first one is study population. Since the recruited patients in the present population were postmenopausal women attending at Gynaecological Out-patient Department of CWH (Yangon) for various reasons. LUTS was assessed in those who gave consent to urodynamic investigation. So it can not reflect to all menopausal women. The method used to classify the type of UI was using questionnaires. The method of data collection may reflect the difference in distribution or prevalence of LUTS and thus symptoms based clinical diagnosis.

Although the room for investigation provided the privacy for patients, Myanmar patients were not familiar with commode. Since the patients voided at not usual position, usual bathroom, the result might or might not reproduce their daily voiding pattern.

In conclusion, objective diagnosis would be more accurate if these limitations were overcome. The diagnostic workup for lower urinary tract problems should be based on using LUTS specific questionnaires, clinical examination, simple investigations such as urine RE, bladder diary, ultrasound and careful interpretation of urodynamic data in order to attain the best treatment plan for each individual patient.

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