FEMALE UROLOGY
Original Article

Assessment of bladder wall thickness in women with overactive bladder

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ABSTRACT

Objective: To compare bladder wall thickness (BWT) between female patients with overactive bladder (OAB) and aged-matched healthy controls.

Material and methods: Thirty-six female patients with OAB and 31 healthy women were enrolled in the present prospective observational study. Qmax and Qave were measured by using uroflowmetry in all of the women in the patient and control groups, and also maximum bladder capacity (MBC), post- void residual urine (PVRU), prevoiding and postvoiding BWT were measured by using transabdominal ultrasound. Lower urinary tract symptoms of the participants were assessed by using Overactive Bladder Version-8 (OAB-V8) and International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF). All of the data were statistically compared between the patient and control groups. In the patient group, the relationships between parameters were evaluated correlation analysis.

Results: The mean age of the patients and controls were similar (respectively, 45.58±12.35 and 44.21±11.60 years (p=0.68). The mean pre- and post-voiding BWT, OAB-V8 and ICIQ-SF scores of the patients were significantly higher than the controls. In the patient group, the moderate positive correlations between BWT with Qmax (p=0.02) and Qave (p=0.02) were found.

Conclusion: This study showed that the BWTs of the female patients with OAB are higher than those of healthy women. Further studies should investigate the changes in BWT of patients with OAB after treatment of OAB.

Keywords: Bladder wall thickness; diagnosis; overactive bladder; women.

Introduction

Overactive bladder (OAB) is generally associated with nocturia, pollakiuria, and characterized by urge to urinate with or without urinary incontinence.[1] In OAB, urodynamics can aid in making a diagnosis, however diagnosis is established with anamnesis. Its prevalence in adult population is 12%, and it is a complex condition which affects more than 17 million Americans.[2] Underlying pathophysiology of OAB has not been fully elucidated, however its multifactorial nature has been accepted. OAB may develop as an outcome of various nerurologic disorders, aging, and intrinsic detrusor anomalies which may lead to detrusor overactivity, sudden urge to void, and urge incontinence. In patients with overactive bladder 50-64% of the symptoms are caused by overactive detrusor (DOA).[3] DOA is an urodynamic finding, and it is diagnosed by demonstrating unavoidable need to urinate together with involuntary detrusor contractions at filling phase of cystometry.[4] The place of urodynamics in the diagnosis of OAB has not been clarified. Although some publications have indicated its benefit, adequate evidence on routine use of urodynamic methods in the diagnosis of OAB is lacking.[5] It is an invasive, and costly method which precludes its routine use in the diagnosis of OAB. As a current issue, measurement of bladder wall thickness can be a diagnostic determinant in OAB. A correlation that will be found especially between severity of symptoms, and bladder wall thickness in patients with OAB may aid in diagnosis. Our aim is to investigate diagnostic value of bladder wall thickness using transabdominal ultrasound in female patients with OAB.

Material and methods

A total of 36 female patients who applied to the outpatient clinics of urology with symptoms of OAB between January, and November 2015 constituted the patient group of our

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observational, and prospective study. Female patients aged >18 years with symptoms of OAB were included in the study. Patients who were receiving treatment for OAB, those with urinary stone, infection or other urinary system pathologies were excluded from the study. Thirty- one women presented to our outpatient clinic with symptoms of myalgia or for routine controls, and those without any evidence of urinary system disease constituted the control group. All study participants filled the Overactive Bladder Version-8 (OAB-V8)[6], and International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF)[7] whose validation study of its Turkish version was performed so as to evaluate lower urinary system symptoms. Approval for the study was obtained from Ethics Committee of Celal Bayar University School of Medicine. All patients gave their under-signed consent forms.

Detailed medical anamneses were obtained from all patients, and their demographic characteristics including their heights, and body weights were recorded. Routine urinalysis, blood urea nitrogen, and creatinine values were determined. All female study participants in the patient, and the control groups underwent uroflowmetry, and their Qmax, and Qave values were calculated. Besides all study participants underwent transabdominal ultrasonography (US), and measurements of their maximum bladder capacity, post-void residual urine, pre-, and postvoiding bladder wall thickness (BWT) were performed. BWT measurements of full bladder were performed while 250-300 mL urine was present in the bladder. BWT measurements of empty bladder were done while the bladder contained maximum 50 cc urine. Siemens Acuson Antares 2011 US device and A CH4-1 convex probe with 1-4 MHz frequency were used for measurements. Bladder wall thickness, uroflowmetry data, OAB-V8, and ICIQ-SF scores of the control, and patient groups were compared.

Statistical analysis

For statistical analyses Statistical Package for the Social Sciences 20.0 (IBM SPSS Statistics; New York, USA) was used. Parametres of the patient, and the control groups were compared using Student –t test. Data of the patient group were compared using Pearson correlation test. P<0.05 was accepted as the level of statistical significance.

Results

Mean ages of the patient, and the control groups were statistically comparable. (45.58±12.35 vs. 44.21±11.60 years, p=0.68). Mean ages, body mass index, Qmax, Qave, maximum bladder capacity, amount of post-void residual urine, BWT before, and after voiding, OAB-V8, and ICIQ-SF scores are presented in Table 1. Pre-, and post-voiding BWT, OAB-V8, and ICIQ-SF form scores were found to be significantly higher in the patient group. When correlation analyses were performed for all parametres in the patient group, a moderately positive correlation was found between BWT, and both Qmax (p=0.02), and Qave values (p=0.02).

Table 1. Comparison between the patient, and the control groups

	Patient group (n=36) Mean±SD (minimum-maximum)	Control group (n=31) Mean±SD (minimum-maximum)	p
Age (year)	45.58±12.35 (21-60)	44.21±11.60 (20-60)	0.68
BMI (kg/m^2)	25.84±4.12 (16.53-33.91)	24.44±5.63 (17.04-32.12)	0.12
Qmax (mL/sn)	26.55±6.29 (15.21-39.39)	28.21±6.65 (21.25-38.45)	0.09
Qave (mL/sn)	12.48±3.62 (7.66-19.51)	13.25±3.96 (9.21-18.56)	0.25
MBC (mL)	370±127 (212-630)	367±96 (270-550)	0.65
PVRU (mL)	46±41 (0-120)	24±12 (0-70)	<0.001**
BWT (mm) (full bladder)	2.58±0.7 (1-4)	2.01±0.6 (1-3.4)	<0.05*
BWT (mm) empty bladder)	4.33±1.21 (2.4-8)	3.25±1.01 (2.2-5.1)	<0.001**
OAB-V8	23.58±7.98 (8-38)	3.2±2.5 (0-7)	<0.001**
ICIQ-SF	11.09±3.5 (5.18)	1.2±0.2 (0-3)	<0.001**

*p<0.05 was accepted as the level of statistical significance, **p<0.001 was accepted as the level of statistical significance. BMI: body mass index; MBC: maximum bladder capacity; PVRU: Post-void residual urine; BWT: bladder wall thickness; OAB-V8: Overactive Bladder Version-8; ICIQ-SF: International Consultation on Incontinence Questionnaire-Short Form

Discussion

Overactive bladder syndrome is characterized by frequent need for urination, urgency with or without urinary incontinence, and its incidence both in Europe, and Northern America is nearly 17 percent. In our country incidence of OAB in women is 27%, and its most important risk factor is history of enuresis nocturna.[8] OAB has directly effected quality of life of a large scale of patient population which led to conduction of many researches on this issue. In the diagnosis, and posttreatment follow-up of OAB, in place of an invasive method of urodynamic examinations, new noninvasive methods with higher diagnostic value have been still investigated. As a diagnostic marker, potential use of BWT values in cases with AOB has been a current issue.

Although US has not a higher diagnostic sensitivity, and specificity as urodynamic examinations in the evaluation of OAB, its user-friendly nature, nd noninvasiveness are its advantages. In patients with OAB, BWT measurements are generally performed by transvaginal US, and consistent results have been reported.[4] Our study differed from most of the other studies in that we performed BWT measurements using transabdominal US. We think that when compared with the transvaginal US, transabdominal US is more feasible, and preferable by the ambulatory patients encountered in daily urology practice. In a literature study which compared transabdominal, and transvaginal US for the evaluation of pelvis, despite superiority of transvaginal method, the authors recommended use of transabdominal method for routine applications, and in case of need transvaginal US may be used during monitorization of the patient.[9] Similarly, it has been reported that transabdominal US yielded the thickest BWT values, however its shorter learning curve, and easy applicability for clinicians were also indicated.[10] In a review article where diagnostic BWT and detrusor wall thickness (DWT) measurements were evaluated in patients with lower urinary tract symptoms, BWT measurements were found to be more valuable in the diagnosis of DOA in women with lower urinary tract symptoms, and therefore DOA measurements were recommended.[11]

In a study by Lekskulchai et al.[12] a significant correlation between transvaginal BWT measurements, and urodynamic diagnosis of DOA was observed. Although authors detected a significant correlation, they also indicated that BWT measurements can not replace urodynamic evaluations. In various studies, a clear-cut consensus was not available about the cut-off value of BWT regarding diagnosis of OAB. Despite standardization of cut-off value for BWT was emphasized, with currently available data such a cut-off value can not be determined.[4] In a study by Kuhn et al.[13] mean BWT measurements in patients with urodynamically detected stress type urinary incontinence, DOA, and bladder outlet obstruction were found to be 3.78±0.39 mm, 4.97±0.63 mm, and 6.01±0.73 mm, respectively. Besides, a positive correlation was reported between the ratio of detrusor pressure to maximum flow rate and BWT. In a similarly designed study Serati et al.[14] performed BWT measurements using transvaginal ultrasound in patients with various urodynamically established diagnoses. Mean BWT values in patients with normal urodynamic findings, and DOA were detected as 4.19±1.14 mm, and 5.22±1.17 mm, respectively. It was reported that higher BWT values were associated with urodynamically detected detrosor overactivity, and 6.5 mm was the most appropriate cut-off value.

The common point of the abovementioned studies is use of transvaginal US, and comparison of BWT measurements among urodynamically diagnosed patients. Our study differs from other studies in that symptom-based evaluations were made in our study. None of our patients had been urodynamically diagnosed. Only OAB patients diagnosed based on their symptoms, and compared with normal healthy individuals. In the study by Panayi et al.[15] whose study design was closest to ours, BWT values of patients with OAB symptoms were compared Median BWT measurements of the patients with stress, and mixed type incontinence based on International Continence Society criteria, and those of OAB syndrome were found to be 4.7, 5.4, and 5.6 mm, respectively. In our study, pre-, and post-voiding BWT measurements performed using transabdominal US examinations of the patients diagnosed as OAB were evaluated separately, and compared with those of normal healthy individuals without any urinary system complaints. Pre-, and postvoiding BWT measurements were found to be significantly higher in patients with OAB when compared with the healthy controls. In previous studies higher BWT values were found in patients with urodynamically detected DOA, and in our study we detected increased BWT in clinically diagnosed OAB patients even though urodynamic studies did not confirm the diagnosis of DOA. Measurement of BWT using transabdominal US is more advantageous than urodynamics in that it is not costly, and it is easily applicable. In these patients measurement of BWT is a highly sensitive, and specific method, thanks to these advantages it can be used in some patients before resorting to urodynamic examinations.

An important deficiency of our study is our inability to classify patients according to symptomatic severity of OAB, and evaluate if BWT values differed between groups due to scarce number of patients. We recommend evaluation of the correlation between the degree of symptomatic improvement in OAB patients after anticholinergic treatment, and BWT measurements in further studies. Evaluation of this correlation may provide objective information about the extent of therapeutic benefit for the patients. In a study performed on this subject, decrease in BWT from 5.7 mm to 4.6 mm at 12. week of the anticholinergic treatment was detected. Complete disclosure of the effect of treatment on BWT requires conduction of additional studies reinforcing outcomes of this study.[16]

In conclusion our study data have shown increased BWT in women with OAB both before, and after urination when compared with healthy women. Since measurements using transabdominal US are simple, cheap, and noninvasive which can be applied in outpatient basis, this method should be considered in patients with OAB symptoms. Further comparative studies should be conducted with increased number of patients where severity of OAB symptoms, and BWT measurements were compared. Besides, we also recommend further studies where correlations between changes especially in BWT measurements and improvement in symptamotology will be investigated.

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Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Celal Bayar University Medical School Local Ethical Commitee (No: 20478486-309).

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