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Original Article

Are There Any Differences in Urodynamic Studies between Overactive Bladder Patients with Benign Prostatic Hyperplasia and Those without Benign Prostatic Hyperplasia?

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Abstract

Introduction: **Overactive bladder and benign prostatic hyperplasia are quite common in middle age men. Some patients may have both of these conditions in the same time. Urodynamic study is still the most useful diagnostic test in this group of the patients because their lower urinary tract symptoms are unreliable.**

Objective: **To compare results of urodynamic studies between overactive bladder patients with benign prostatic hyperplasia and overactive bladder patients without benign prostatic hyperplasia.**

Materials and Methods: **From November 2007 to October 2009, 75 urodynamic studies were performed for male overactive bladder patients who were 40 years or older. The patients were retrospectively divided into two groups. Group I consisted of overactive bladder patients who also had been clinically diagnosed with benign prostatic hyperplasia, and Group II consisted of overactive bladder patients without benign prostatic hyperplasia. There were 41 patients in group I and 34 patients in group II. The results of the two groups were analyzed and compared.**

Results: **There was a statistical difference only in terms of median post-void residual urine volume. Detrusor overactivities were demonstrated in 21/41(51.2%) patients of Group I and in 19/34 (55.9%) patients of Group II (P-value = 0.687). Nine patients in Group I (9/41; 21.9%) and eight patients in Group II (8/34; 23.5%) represented bladder outlet obstruction (P-value = 0.871). Impaired detrusor contractilities were found in only five patients of Group I (P = 0.060).**

Conclusions: **The urodynamic results indicate that only the median post-void residual urine volume was statistically different between two groups of patients.**

Key words: **Urodynamic studies, Overactive bladder, Benign prostatic hyperplasia**

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Introduction

Overactive bladder (OAB) is not an uncommon condition in men. The prevalence of male OAB in the general population was about 11.8-29.9%.[1,2] This prevalence was not different from OAB in women. Diagnosis of OAB is basically made from urgency symptom without any abnormal physical or urine examination.[3] Detrusor overactivity (DO) is the most likely diagnosis found during urodynamic studies (UDS) for male OAB.[4] Benign prostatic hyperplasia (BPH) is also a common disease among middle aged men and elderly. The prevalence of BPH was about 1.2-36% in men 40 years or older.[5] In general, we diagnose BPH by taking history of patients, a digital rectal examination, focused nuerological examination, and urine analysis (UA).

In clinical practice, we often find BPH patients who still have significant OAB symptoms demonstrate a significant improvement in voiding symptoms due to BPH medications. The etiologies of OAB symptoms may come from bladder outlet obstruction (BOO), and/or primary bladder conditions. UDS are generally recommended for this complex condition.

The major aim of our study was to analyze and compare the UDS findings between OAB patients with BPH and OAB patients without BPH. We hypothesized that most OAB symptoms in BPH patients may originate from bladder dysfunction rather than BOO alone. If our hypothesis was correct, the UDS data between the two groups of patients should not be significantly different. The results of this study will contribute to knowledge about causes of OAB symptoms in BPH patients, which may lead to appropriate diagnosis and treatment.

Materials and Methods

The charts of all male patients who underwent UDS for OAB symptoms in Tuen Mun Hospital between November 2007 and October 2009 were reviewed. Patients were enrolled in the study if they met all of the following criteria: (1) A diagnosis of OAB more than 1 month before study. The International Continence Society (ICS) definition of OAB is urgency, with or without urge incontinence, usually with frequency and nocturia.[3] (2) A patient who was 40 years old or more at the time of study. (3) A patient who had adequate data for evaluation. Patients were excluded form the study if they had any of the following conditions: (1) A patient who had stopped antimuscarinic agents less than two weeks before UDS. (2) A known case of neurogenic bladder. (3) A patient who had previous pelvic surgery. (4) Diabetes mellitus. (5) A history of pelvic radiation treatment. (6) A history of urethral stricture. (7) A history of urinary tract stone or cancer. (8) A case of polyuria.

All patients in the reviewed charts had completed International Prostate Symptom Score (IPSS) and Quality of Life (QoL) score due to urinary symptoms before UDS. Regarding the QoL score, there were 7 scores for evaluation by the patients (0 = Delighted, 1 = Pleased, 2 = Mostly satisfied, 3 = Mixed (about equally satisfied and dissatisfied), 4 = Mostly dissatisfied, 5 = Unhappy, and 6 = Terrible). All patients underwent conventional UDS, utilizing Dantec urodynamics (Royal Portbury, Bristol, England) hardware and software. Studies were conducted by our experienced urologists according to ICS recommendations.[6] Room temperature water was used as the filling media. All catheters were 7 Fr. The usual infusion rate was 50 ml/min or less according to estimated bladder capacity. Patients were in a sitting position for the study. Coughs were used for catheter evaluation and to provoke DO during filling phase of UDS. First desire to void (FDV) and maximum cystometric capacity (MCC) were recorded. Any DO, low compliance and/or leakage were documented. Voided volume, maximum flow rate (Qmax), detrusor pressure at maximum flow (PdetQmax), and post-void residual (PVR) volume during urodynamic voiding study were recorded. Low compliance was considered if any bladder capacity/detrusor pressure was less than 12.5 ml/mmH_2O.[7] The provisional ICS nomogram was used to determine bladder outlet obstruction.[8] Impaired detrusor contractility (IDC) was defined as a Qmax of less than 10 mL/s, together with a detrusor pressure of less than 30 cmH_2O.[9]

The patients were divided into two groups according to history of BPH. Group I consisted of OAB patients who had been previously diagnosed as BPH before the study. BPH was clinically diagnosed by experienced urologists in Tuen Mun Hospital. All patients had prostate more than 20 ml, measuring with transrectal ultrasonography. These patients had received medical therapy for BPH for more than one month but still had OAB symptoms. They underwent

UDS without stopping BPH medication. Group II consisted of OAB patients without diagnosis of BPH. Clinical Charac-teristics and UDS data between the two groups were analyzed and compared using student *t*-test, Mann-Whitney *U*-test, Chi-square, and Fisher's exact test. Differences with a value of P <0.005 were considered to be significant.

Results

Seventy five patients were enrolled in the study. There were 41 patients in Group I and 34 patients in Group II. The mean age (± SD) of Group I was 60.0 (± 10.6) years and the mean age of Group II was 50.2 (± 7.9) years (P <0.001). The mean IPSS and mean QoL score were 21.7 (±8.3) and 4.2 (±1.8), respectively in Group I. Group II had a mean IPSS equal to 19.5 (± 7.9) and a mean QoL score of 4.2 (± 1.1). There were no statistical differences in IPSS (P = 0.231) and QoL score (P = 0.872) between the two groups.

At the time of UDS, Group I patients still received BPH medications. All of them had been treated with alpha1 blockers alone or combined with finasteride for more than one month. Persistent OAB symptoms were the indications for UDS in all of them. Nineteen patients (19/41; 46.3%) used terazosin alone. Four patients (4/41; 9.8%) used terazosin combined with finasteride. Other medications were prazosin in 10/41(24.4%) patients, doxazosin in 4/41(9.8%) patients, tamsulosin in 2/41 (4.9%), and alfuzosin in 2/41(4.9%) patients.

According to UDS, Table 1 represents the mean values of FDV, and Qmax. Table 1 also shows median values of MCC, voided volume, PVR volume, and PdetQmax, also. PVR volume was significantly different between the two groups. Both groups of patients did not differ with respect to FDV, MCC, Qmax and PdetQmax. Low compliance, DO, obstructed, equivocal, and unobstructed were detected during urodynamic studies in both groups of the patients. Exceptionally, IDC was observed in only five patients of Group I. Every percentage of these diagnoses was not significantly different between Group I and Group II. The data are summarized in Table 2.

Discussion

Mean age is the only clinical characteristic which is considered as significant difference between the two groups of patients. The OAB patients with BPH appeared to have a higher age than the OAB patients without BPH. Patients who had a younger age may

Table 1 FDV, MCC, Qmax, voided volume, PVR volume, PdetQmax between two groups of the patients

Parameter	Group I (n = 41)	Group II (n = 34)	p-Value
Mean FDV (ml) (± SD)	231.7 (± 101.4)	193.6 (± 80.8)	0.080*
Median MCC (ml) (25%, 75%)	401 (400, 402)	400 (400, 401)	0.118**
Mean Qmax (ml/sec) (± SD)	11.1 (± 4.9)	12.4 (± 5.2)	0.265*
Median Voided volume (ml) (25%,75%)	328 (181, 383)	333 (261, 398)	0.852**
Median PVR volume (ml) (25%,75%)	55 (10 ,170)	12.5 (0, 120)	0.034**
PdetQmax (cmH_2O) (25%,75%)	44 (34, 58)	46 (39, 57)	0.579**

FDV: first desire to void, MCC: maximum cystometric capacity, Qmax: maximum flow rate, PVR volume: post-void residual volume, PdetQmax: detrusor pressure at maximum flow, *statistical comparison using student *t*-test, **Mann-Whitney U-test, p <0.05 significant.

Table 2 Numbers of Low compliance, DO, obstructed, equivocal, unobstructed, and DU between two groups of the patients

Parameter	Group I (n = 41)	Group II (n = 34)	p-Value
Low compliance (n) (%)	10 (24.4)	9 (26.5)	0.837*
DO (n) (%)	21 (51.2)	19 (55.9)	0.687*
Obstructed (n) (%)	9 (21.9)	8 (23.5)	0.871*
Equivocal (n) (%)	13 (31.7)	15 (44.1)	0.269*
Unobstructed (n) (%)	19 (46.3)	11 (32.4)	0.218*
IDC (n) (%)	5 (12.2)	0 (0)	0.060**

DO: detrusor overactivity, IDC: Impaired detrusor contractility, *statistical comparison using Chi-square test, **Fischer's exact test, p <0.05 significant

have a high tendency to be clinically diagnosed as OAB alone. Because we usually made diagnoses from only a patients' history, digital rectal examinations, and transrectal ultrasonography, we could have both over and under diagnoses of BPH. We know that benign prostate gland enlargement (BPE) accompanied with lower urinary tract symptoms (LUTS) is not absolutely equal to benign prostatic obstruction (BPO), so many urologists may have a tendency to use age as a guide for diagnosis of BPH.[10] In clinical practice, we usually diagnose male patients as BPH if they are more than 40 years old and OAB for younger men. To sum up, the mean ages in this study may represent two views, one is the true characteristic of the patients and another is an effect from physicians' bias.

Interestingly, the IPSS and the QoL score did not have any statistical differences between the two groups of patients. Our results were similar to a study by Irwin and colleagues.[11] They demonstrated that there was substantial overlap of storage, and voiding symptoms among all men and in men with OAB symptoms. Men with OAB symptoms were more likely to experience multiple LUTS subtypes, which may be caused by BPO. The prevalence of all LUTS increased with age among the general population; only storage LUTS increased with age among men with OAB symptoms. LUTS and IPSS increased with age in all men and men with OAB symptoms. LUTS severity may have been underestimated by the IPSS, which does not assess incontinence. Men with LUTS commonly experience coexisting storage, voiding, and postmicturition symptoms, emphasizing the need for comprehensive urologic assessments. Men with OAB symptoms reported more LUTS and greater severity than the general population. QoL was related to number of LUTS and urgency severity. There was demonstrated that our patients had a same level of bothersome before UDS.

For UDS parameters, PVR volume was the only parameter which was different between both groups of patients. PVR volume of Group I was statistically greater than the other group of patients. Because there was not a significant difference in about BOO between both groups, the high value of PVR in Group I may come from bladder dysfunction. IDC was a common finding in old age patient and it was investigated in a lot of literature. Smith concluded that IDC has been regarded as etiologic of detrusor underactivity (DU).[12] He examined the contributions of motor, sensory, and biomedical dysfunctions to the clinical problem of DU and detrusor hyperactivity/impaired contractility. However, an age-related degradation in detrusor contractility as the primary contributor to impaired bladder emptying has not been conclusively demonstrated. The relative contributions of motor, sensory, and biomechanical dysfunctions to impaired voiding performance independent of outlet obstruction associated with aging remain to be elucidated. Though, IDC in our study was not statistically significant between the two groups, the P-value was nearly close to 0.005 ($P = 0.060$). If this study had more population for evaluation, the result of IDC may have a significant difference among the two groups of patients.

The clinical diagnosis of IDC when present alone or in association with other bladder conditions such as detrusor overactivity is challenging, because symptoms lack adequate precision. Nevertheless, it cannot differentiate primary IDC from retention secondary to BOO.[13] Hoffner K and his collogues investigated the symptomatic and quality of life (QoL) response to treatment with tolterodine extended release (ER) in subgroups of male patients with OAB and LUTS suggestive of non-obstructive BPH according to age, symptom severity, diabetes mellitus status, and concomitant treatment for LUTS. They concluded that IPSS severity classes, aged ≤ 65 years or above, with or without concomitant diabetes or alpha-blockers, symptoms and QoL improved markedly during treatment with tolterodine ER.[14] Anderson stated the the focus of treatment for LUTS has thus shifted from the prostate to the bladder and other extraprostatic sites. LUTS include symptoms of the overactive bladder (OAB), which are often associated with detrusor overactivity. Selective beta(3)-adrenoceptor agonists and antimuscarinics are potentially useful agents for treating LUTS, particularly for storage symptoms secondary to outflow obstruction. Other agents of potential or actual importance are antagonists of P2X(3) receptors, botulinum toxin type A, endothelin (ET)-converting enzyme inhibitors, and drugs acting at vanilloid, angiotensin, and vitamin D(3) receptor sites.[15] The authors' previous study proved that intravesical capsaicin instillation is an effective treatment for overactive bladder symptoms in benign prostatic hyperplasia patients.[16]

From this study we may indicate that OAB

symptoms in BPH patients appeared to be from bladder condition more than BOO. Most clinical findings and UDS parameters were the same in both groups of patients. UDS is very important for making a correct diagnosis in OAB with BPH and can guide the way to appropriate treatment. OAB symptoms in both groups of patients may have nearly the same etiologies. Treatment outcomes can be predicted from UDS findings in both groups of patients.

Conclusions

The present study indicates that only PVR volume was statistically different between the two groups of patients. Bladder conditions could be the major causes of OAB symptoms in BPH patients.

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