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Clinical Diagnosis of Bladder Outlet Obstruction in Men With Lower Urinary Tract Symptoms: Reliability of Commonly Measured Parameters and the Role of Idiopathic Detrusor Overactivity

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Aims: There is no generally accepted consensus how to evaluate patients with lower urinary tract symptoms (LUTS) suggestive of bladder outlet obstruction (BOO). We have tried to determine whether the most frequently used objective variables as prostate volume, IPS-score, maximum flow rate, residual urine volume, functional bladder capacity, and pressure-flow study are reliable for diagnosis of BOO and we investigated the influence of idiopathic detrusor overactivity (IDO) on this condition. **Methods:** A total of 153 men with LUTS and suspected BOO were systematically examined with routine investigation including digital rectal examination, transrectal ultrasound (TRUS), post-void residual urine volume measurement, uroflowmetry, and pressure-flow study. All patients completed IPS-score. Patients were divided into groups based on Schäfer's grade of obstruction and incidence of IDO and clinical and urodynamical variables were compared. **Results:** At baseline, 45.8% of the patients were urodynamically moderately obstructed and 37.9% were found to be severely obstructed. The grade of obstruction did not correlate with age. Prostate volume, post-void residual volume (PVR), and maximum flow rate correlated significantly with the degree of obstruction. The mean IPS-score remained almost unchanged throughout all obstruction groups. The incidence of IDO was 40.5% and increased from 16% in the minor obstruction group to 38.6% and 53.4% in the moderate and severe obstruction group, respectively. The patients with IDO were older, had larger prostates and were more obstructed. There was no impact of IDO on symptomatology of BOO. **Conclusions:** These data indicate that IPS-score does not achieve sufficient diagnostic accuracy and its role in the assessment of BOO is limited. The grade of obstruction is more related to prostate volume, PVR, and maximum flow rate. BOO and IDO seem to be related and have numerous mutual interactions. *Neurourol. Urodynam. 22:301–305, 2003.*

Key words: bladder outlet obstruction; BPH; detrusor overactivity; diagnosis

INTRODUCTION

Bladder outlet obstruction (BOO) is one of the most common condition in elderly men [Berry et al., 1984]. The main cause of BOO is benign prostatic enlargement (BPE) secondary to benign prostatic hyperplasia (BPH), which is a condition almost inevitably associated with aging. Another possible cause of BOO is abnormal urethra function. The prevalence of this condition increases with age and up to 25% of men over 60 years will require surgical treatment for BOO [Yang et al., 1999]. However, there is no generally accepted consensus how to evaluate patients with lower urinary tract symptoms (LUTS) suggestive of BOO. Diagnostic difficulties can be explained by the complex aetiology of symptoms. Some patients have prostatic hyperplasia, some have symptoms, and others obstruction, combined or in isolation.

Another common cause of LUTS is overactive bladder (OB), which can be caused by several neurological disorders or presently unknown causes. It should be emphasized that BOO combined with OB is very common [Knutson et al., 2001]. Most of these patients will be relieved of their symptoms of OB if the BOO decreases. However, if the patient's major symptoms are caused by the OB, but not by BOO, relieving the BOO by decreasing the size of the prostate will not help the patient. Thus, because of the similarity in symptoms of BOO and OB, it is an important and challenging task for the urologist to separate these two conditions preoperatively [Blaivas, 1996].

Today we have diverse possibilities for treatment of BPH, some of which have only a minor effect on obstruction. The

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proper evaluation of BOO may therefore be of importance to help urologists identify and treat patients who will benefit from different therapeutic measures. The most frequently used variables to evaluate patients with BOO are prostate volume, symptom score, residual urine volume, uroflowmetry, and pressure-flow parameters. Unfortunately, not all of them are generally accepted as routine diagnostic steps. It is still widely believed that LUTS is almost always due to enlarged prostate and can be cured only by reducing the size of prostate. Sixty percent of almost all British urologists use prostate size as a determinant when deciding on therapy of benign prostatic obstruction [Yang et al., 1999].

The aim of this study is to determine whether routine clinical and urodynamic parameters are reliable for the diagnosis of BOO, and we investigated the influence of idiopathic detrusor overactivity (IDO) on this condition.

MATERIALS AND METHODS

A total of 153 men with LUTS and suspected BOO and without history of neurological disease were systematically examined with routine investigation including digital rectal examination, transrectal ultrasound (TRUS), post-void residual urine volume measurement, measurement of functional bladder capacity, uroflowmetry, and pressure-flow study. All patients completed the IPS-score questionnaire.

TRUS and post-void residual volume (PVR) were performed by means of a UA 1082® ultrasonic device, Bruel & Kjaer, Naerum, Denmark. Measurement of the whole prostate was performed, using an ellipsoid formula (width × height × length × $\pi/6$).

Before cystometry, the ice-water test was performed by rapid infusion of cold (0°C) isotonic saline solution, in order to diagnose patients with neurological disorders [Geirsson et al., 1993]. These patients were then excluded from the study.

For the cystometry and pQS, a Uro Dyn UD2000 Urodynamic system (MMS, Delft, Holland) was used. Classification of BOO was performed according to the Schäfer nomogram and Detrusor Adjusted Mean PURR Factor (DAMPF) scale [Schäfer, 1995]. The patients were thus divided into three groups. No or slight obstruction (DAMPF < 42), moderate obstruction (DAMPF 42–65), and severe obstruction (DAMPF > 65).

The definitions of the Standardization committee of the International Continence Society (ICS) were used [Abrams et al., 2002]. If there is evidence of neurogenic disorder, the OB is classified as "neurogenic detrusor overactivity," if not it is called "idiopathic detrusor overactivity" (IDO). The cystometric curves were classified according to Fall et al. [1995].

Several clinical and urodynamic variables were compared between these groups using the non-parametric Kruskal–Wallis test. The incidence of detrusor instability in both groups were compared using the Chi-square test. Because of not normal distributed parameters, the Mann–Whitney test was used to compare the group of patients with stable detrusor and IDO. Linear regression analysis was performed to calculate the correlation between all parameters.

RESULTS

Overall, in the 153 patients, mean age was 68.7 ± 8.5 (range 48–86 years). Of the patients, 37.9% were severely obstructed and 45.8% were moderately obstructed. The overview of baseline variables describing this sample of men with LUTS and comparison of several clinical and urodynamic variables depending on the grade of obstruction is summarized in Table I. Maximal flow rate, prostate volume, and PVR showed significant differences between groups. The grade of obstruction did not increase with advancing age and the value of symptoms remained almost unchanged throughout all obstruction groups. The overall incidence of IDO was 40.5% and increased appreciably from 16% in the group of minor BOO to 38.6% and 53.4% in the group of moderately and severely obstructed, respectively. This increase was strongly significant (Chi-square test).

When the population was divided into the three groups according to the value of IPS-score, it is apparent, that there is no impact of IDO on symptomatology of BOO. The

TABLE I. Results of Age, Prostate Volume, Uroflow, IPS-Score, Postvoiding Residual Urine, Functional Bladder Capacity, and Incidence of Idiopathic Detrusor Overactivity According to Three Classes of Obstruction

	Total	DAMPF < 42	DAMPF 42–65	DAMPF > 65	*P**
Number of patients	153	25	70	58	
Age	68.7 (8.5)	68.5 (7.4)	68.1 (8.7)	69.7 (8.8)	NS
Prostate volume (ml)	39.8 (22.5)	34.1 (14.8)	35.9 (20.6)	46.9 (25.7)	0.009
Qmax (ml/sec)	11.2 (5.3)	14.6 (7.0)	11.9 (4.7)	8.8 (3.9)	<0.0001
IPSS	19.8 (7.5)	19.5 (7.8)	19.4 (7.8)	20.3 (7.1)	NS
Residual volume (ml)	81.4 (74.9)	56.9 (60.3)	76.5 (58.3)	97.9 (93.4)	0.04
Functional bladder capacity (ml)	327.6 (159.9)	313.9 (156.2)	360.2 (184.9)	294.2 (118.6)	NS
Incidence of IDO (%)[a]	40.5	16	38.6	53.4	0.004

NS, not significant ($P > 0.05$); IDO, idiopathic detrusor overactivity. Results are presented as mean (± standard deviation).
*Significance of differences between different groups of obstruction was estimated by the non-parametric Kruskal–Wallis test.
[a]Chi-square test.

TABLE II. Differences Between Parameters of BOO in Patients With Stable Detrusor and Patients With IDO—Mean (±SD)

	Stable detrusor	IDO	P*
Number of patients	91	62	
Age	67.5 (8.4)	70.6 (8.3)	0.03
Prostate volume (ml)	36.3 (20.8)	44.9 (24.1)	0.02
Qmax (ml/sec)	11.4 (5.2)	10.8 (5.5)	NS
IPSS	19.6 (7.7)	19.9 (7.3)	NS
Residual volume (ml)	76.6 (62.6)	88.6 (89.9)	NS
Functional bladder capacity (ml)	356.6 (178.5)	285.0 (116.8)	0.03
DAMPF	56.3 (16.8)	69.3 (23.9)	0.0003

NS, not significant ($P > 0.05$).
*Significance of differences between groups of men with stable detrusor or IDO was calculated by the Mann–Whitney test.

proportion of patients with IDO was 40% in those with IPSS 5–12, 39.7% in those with IPSS 13–21, and 41.7% in those with IPSS 22–35.

When we investigated the difference between the group of patients with stable detrusor and IDO, we found that there was a statistically significant difference (Mann–Whitney test, $P < 0.05$) in age, functional bladder capacity, and prostate volume (Table II). The patients with unstable bladder were older (70.6 years) and had larger prostates (44.6 ml) and lower functional bladder capacity (285 ml) than the patients with stable bladder (66.9 years; 36.3 ml; 356.6 ml). Moreover, these data revealed a highly significant increase of grade of obstruction in the group of men with IDO.

Table III shows the relationship between age, prostate volume, IPSS, maximal flow rate, post-void residual urine, and obstruction grade.

DISCUSSION

The degree of correlation of several BPH symptom scores with BOO is an area of controversy. It should be emphasized that the IPSS was originally formulated to define lower urinary tract symptom severity in patients with BPE and it is not intended to be used as a tool to diagnose BPH [Cockett et al., 1991]. Abrams [1995] claimed that symptom scoring systems are not specific to age, sex, or disease and are inadequate for diagnosis in an individual patient. This view was confirmed in the present study, as there was no significant correlation between IPSS and the degree of obstruction. There was almost no difference of the IPSS in different obstruction groups (19.5; 19.3; 20.3). Moreover, when linear regression analysis was performed, no correlation was found between IPSS and age, prostate volume, Qmax, residual urine, functional bladder capacity, or DAMPF.

Oesterling [1995] recommends, in patients with BPH, selection of the treatment based on symptoms. The treatment based on the value of symptom score may be justified by the risk of upper urinary tract compromise. However, if BOO put men at this risk, older men would present with obstruction-related hydronephrosis far more frequently than they do [Jepsen and Bruskiewitz, 1998]. In our study, the symptom score does not appear to correlate with age, prostate size, or the grade of obstruction. A large part of symptomatology might be explained by bladder dysfunction. However, in our study there was no impact of IDO on symptomatology of BOO. These findings suggest that the symptom score assessment in elderly men is influenced by subjective interpretation of symptoms and reflects the mixture of diseases which may in different ways contribute to the development of BOO.

Knutson et al. [2001] reported higher age and higher grade of obstruction in men with BOO and coexisting IDO. These findings agree with the present results. Moreover, men with BOO and IDO had significantly larger prostates, too. Therefore, our findings do not support Rosier et al. [1995], regarding BOO and IDO in elderly men as independent features associated with increasing age.

Tong et al. [1995] investigated men with BPH and have reported significantly higher incidence (54%) of intravesical protrusion of the prostate by men with IDO. Their hypothetical explanation of this finding is that intravesical protrusion may in some way increase afferent impulses from the prostate and alter the stability status of the urinary bladder. Larger and more severely obstructed prostates give rise to more pronounced changes in the central nervous control mechanism as well as possibly more directly affecting the peripheral innervation of the bladder, e.g., with increased electrical coupling, as

TABLE III. Correlation Coefficients and Associated *P* Values Between Parameters of BOO

	Age	Prostate volume	Qmax	IPSS	Residual volume	DAMPF
Age	—	—	—	—	—	—
Prostate volume	0.27 (0.0008)	—	—	—	—	—
Qmax	−0.14 (0.09)	−0.16 (0.04)	—	—	—	—
IPSS	−0.01 (0.87)	−0.03 (0.69)	−0.07 (0.36)	—	—	—
Residual volume	0.06 (0.46)	−0.01 (0.95)	−0.22 (0.005)	0.20 (0.01)	—	—
Functional bladder capacity	−0.10 (0.21)	−0.13 (0.09)	0.25 (0.0016)	0.02 (0.76)	0.37 (0.0001)	—
DAMPF	0.12 (0.14)	0.36 (<0.0001)	−0.41 (<0.0001)	0.03 (0.72)	0.18 (0.02)	—

suggested by Brading and Turner [1994]. This is compatible with our finding that prostate volume was significantly higher ($P < 0.02$) in a group of men with IDO (44.9 ± 24) than in men without (36.3 ± 20.8).

Uroflowmetry is a simple and popular diagnostic method for BOO. However, several studies have revealed, that it does not give adequate information about the degree of outflow obstruction and may thus be used rather as an indicative screening test [Waldén et al., 1995]. Statistically significant relationships between peak urinary flow rates and symptoms have been reported but the correlations were weak [Barry et al., 1993; Ezz el Din et al., 1996; Venrooij and Boon, 1996]. Uroflowmetry can be influenced by a number of extraneous factors, such as learning effects, diurnal variation, fluid and medication intake, and bladder disorders [Abrams and Griffiths, 1979]. In contrast to these findings, we found a strongly significant relationship between Qmax and the grade of obstruction ($r = -0.41$; $P < 0.0001$). Maximum flow rate decreased significantly from 14.6 (±7.0) ml/sec in the minor obstructed group to 11.9 (±4.7) ml/sec and 8.8 (±3.9) ml/sec in the moderately and severely obstructed group, respectively. Except for the IPS-score, Qmax correlated weakly with all parameters of BOO.

Madersbacher et al. [1996] explain the well-established age-associated decrease in maximum flow rate predominantly by an increase in the occurrence of bladder overactivity, which enhances voiding frequency. In our group of men without IDO, Qmax reached 11.4 (±5.2) ml/sec, which was not significantly different from the Qmax of men with IDO 10.8 (±5.5) ml/sec.

It has been demonstrated that up to one third of men with LUTS do not have BOO [Abrams, 1994]. Chances for a favourable outcome of de-obstructed therapy are less, when no obstruction is present. It has been shown that, unobstructed patients undergoing TURP did less well symptomatically than obstructed patients [Schäfer et al., 1989]. Complaints by patients without obstruction are often owing to bladder overactivity. Treatment of bladder overactivity is a complicated and delicate task with several aspects to consider. These matters were discussed recently in supplement from Urology [2000] and in BJU International [2000]. The present data show that the incidence of IDO in men with LUTS increased with the grade of obstruction and age. However, there is no impact of IDO on the symptomatology of BOO.

CONCLUSIONS

To be able to choose the most suitable treatment for each patient, we need proper assessment tools to reveal BOO. In our study, the IPS-score did not correlate with one or several diagnostic parameters of BOO. Apparently, the IPS-score does not achieve sufficient diagnostic accuracy and its role in the assessment of BOO is questioned. The grade of obstruction is more related to prostate volume, PVR, and especially maximum flow rate.

The rate of IDO increased with advanced grade of obstruction, but had no impact on symptoms of BOO. We conclude that in men with LUTS suggestive of BOO, age, prostate volume, and grade of obstruction are associated with higher incidence of IDO. BOO and IDO are associated features and seem to have numerous mutual interactions.

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