

# The Significance of Age on Symptoms and Urodynamic- and Cystoscopic Findings in Benign Prostatic Hypertrophy

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**Summary.** To evaluate influence of age on symptomatology and objective parameters in benign prostatic hypertrophy, preoperative findings in 199 unselected patients during one year were analysed. Symptoms of bladder instability increased with age, as did incidence of uninhibited detrusor contractions and bladder trabeculation, whereas maximum urine flow and obstructive complaints decreased, although prostatic size was the same. In the oldest age groups only was increasing prostatic size associated with increasing bladder trabeculation. Age related changes in neurological control and in the structure of the bladder may be involved, and the present results suggest age to be an important factor in the interpretation of symptoms and objective findings in prostatic hypertrophy.

**Key words:** Benign prostatic hypertrophy, Age, Symptoms, Urodynamics, Cystoscopy.

## Introduction

Frequency, nocturia, urgency, prolonged voiding, poor stream, hesitancy and incomplete bladder emptying are common symptoms of bladder outlet obstruction caused by benign hypertrophy of the prostate (BPH) [9]. During the past twenty years clinical urodynamic studies have become an established part in the evaluation of lower urinary tract disorders including BPH. It is, however, still a matter of debate whether the severity of symptoms correlate to the degree of urodynamically evaluated bladder outlet obstruction [1, 2, 6, 9, 13]. Urodynamic studies in younger and elderly normal males have indicated an age correlated change in micturition. Thus micturition in normal elderly males is characterized by decreasing maximum flow and increasing micturition pressures [4]. The significance of age on symptoms and objective findings in patients with BPH has never been detailed. Thus the purpose of this

presentation is to delineate the significance of age in the interpretation of symptoms, urodynamic- and cystoscopic findings in BPH.

## Materials and Methods

During one year 316 unselected patients without previous prostatic surgery were admitted with symptoms of prostatism to four surgical departments in Aarhus County, Denmark. The patients underwent standardized symptom analysis, physical examination, spontaneous uroflowmetry, post void residual urine determination, cystometry, excretory urography, routine blood chemistry, urine culture and urethrocystoscopy.

Symptom analysis included information on the irritative symptoms of frequency, nocturia, urgency and urge incontinence, and the obstructive symptoms of hesitancy, straining, bladder emptying, poor stream, and prolonged and intermittent voiding. An irritative and an obstructive symptom score was derived from the number of symptoms present in each group.

At uroflowmetry maximum and mean urine flow and voided volume was recorded. Postvoid residual urine was determined by catheterization of the bladder using a Foley catheter 14–18 F. At cystometry 0.9% saline or CO<sub>2</sub> was instilled into the bladder at a speed of 30 cc/min or 60 cc/min respectively. The volume at first sensation of fullness, bladder capacity and the presence of uninhibited detrusor contractions (UDC) were recorded.

During cystoscopy the size of the prostate was estimated by rectal exploration and by measuring bladder neck-verumontanum distance (BVD), and presence of bladder trabeculation or diverticula was registered at a pressure of 60 cm H<sub>2</sub>O. Bladder trabeculation was graded as early or advanced [5].

Of the 316 patients admitted 216 had BPH, out of which 199 patients consented to surgery. The remaining patients have been detailed in another publication [7]. When the prostate was judged to be enlarged beyond transurethral resection a transvesical prostatectomy [8] was performed (32 patients). Otherwise the patients were randomly allocated to transurethral prostatectomy (83 patients) or transurethral resection of prostatic tissue between 4 and 8 o'clock until free view into the bladder from the urethral verumontanum (84 Patients). The surgical outcome has been detailed elsewhere [10].

For the present analysis of significance of age on symptoms and urodynamic- and cystoscopic findings, patients who had surgery were divided into three age groups: Group I < 65 years, group II 65–74 years, group III > 74 years. Chi-square test, one way analysis of variance (F-test) and two way analysis of variance were used.

**Table 1.** Frequency of symptoms in 199 patients with benign prostatic hypertrophy

	All patients <i>n</i> = 199	Age groups			Statistics
		< 65 y <i>n</i> = 63	65–74 y <i>n</i> = 81	> 74 y <i>n</i> = 55	
Number of irritative symptoms	1.9 ± 1.0 <sup>a</sup>	1.8 ± 1.0	1.8 ± 1.0	2.1 ± 1.1	<i>p</i> < 0.05
Urgency	37%	30%	36%	47%	NS <sup>b</sup>
Urge incontinence	15%	10%	10%	29%	<i>p</i> < 0.05
Frequency	39%	48%	36%	35%	NS
Nocturia	84%	81%	86%	87%	NS
Number of obstructive symptoms	2.8 ± 1.4	2.9 ± 1.4	3.0 ± 1.4	2.4 ± 1.4	<i>P</i> < 0.05
Incomplete emptying	28%	24%	28%	35%	NS
Straining	36%	40%	35%	33%	NS
Hesitancy	30%	35%	35%	18%	NS
Prolonged voiding	60%	65%	60%	56%	NS
Poor stream	77%	83%	81%	66%	<i>p</i> < 0.05
Intermittency	29%	35%	30%	22%	NS

<sup>a</sup> mean ± SD<sup>b</sup> NS = no significant difference**Table 2.** Urodynamic findings in patients with benign prostatic hypertrophy

	All patients	Age groups			Statistics
		< 65 y	65–74 y	> 74 y	
Uroflowmetry ( <i>n</i> = 135)					
Maximum flow, ml/s	9.0 ± 0.43 <sup>a</sup>	10.5 ± 0.84	8.3 ± 0.58	7.4 ± 0.70	<i>p</i> < 0.05
Voided volume, ml	181 ± 10.4	226 ± 21	167 ± 13	129 ± 12	<i>p</i> < 0.05
Residual urine ( <i>n</i> = 177)	168 ± 18	167 ± 27	145 ± 24	205 ± 45	NS <sup>b</sup>
Cystometry ( <i>n</i> = 177)					
Volume at first sensation, ml	194 ± 10	196 ± 15	206 ± 16	172 ± 17	NS
Bladder capacity, ml	318 ± 14	323 ± 23	332 ± 23	290 ± 28	NS
Uninhibited detrusor contraction, %	48	40	48	56	<i>p</i> < 0.05

<sup>a</sup> mean ± SE<sup>b</sup> NS = no significant difference

## Results

Frequency of symptoms and urodynamic and cystoscopic findings in the three age groups are shown in Tables 1, 2 and 3. Nocturia, prolonged voiding and poor stream were the most frequent symptoms in all age groups. Urge incontinence and UDC were increasingly frequent with age, and the oldest age groups also had the smallest voided volume. These findings, however, did not affect the symptoms of frequency and nocturia. Although maximum urine flow decreased with age, fewer patients in the oldest age groups complained of poor stream.

Bladder trabeculation was more frequent with age, whereas prostatic size estimated by rectal examination on the cystoscope and by BVD did not differ significantly between the three age groups (Table 3). The weight of

tissue removed in the 115 patients, who had a transurethral or transvesical prostatectomy, correlated well with the estimated prostatic weight ( $r = 0.78$ ,  $p < 0.0001$ ) as well as the BVD ( $R = 0.80$ ,  $p < 0.0001$ ).

Occurrence of bladder trabeculation was associated with the estimated prostatic size as well as age. In the two oldest age groups mean prostatic weight was 25 g compared to 29 g and 41 g among patients with early or advanced trabeculation respectively ( $p < 0.05$ , Two way analysis of variance).

The relation between symptoms and urodynamic- and cystoscopic findings is shown in Table 4. Patients here were divided into three groups according to the presence of irritative symptoms (no irritative symptoms, 1–2 symptoms and 3–4 symptoms) and obstructive symptoms (0–1 obstructive symptoms, 2–3 symptoms and 4–6 symptoms)

**Table 3.** Cystoscopic findings in 173 patients with benign prostatic hypertrophy

	All patients <i>n</i> = 173	age groups			Statistics
		< 65 y <i>n</i> = 57	65–74 y <i>n</i> = 69	> 74 y <i>n</i> = 47	
Incidence of bladder trabeculation	79%	68%	78%	91%	<i>p</i> < 0.05
BVD <sup>a</sup>	3.5 ± 0.1 <sup>c</sup>	3.2 ± 0.2	3.7 ± 0.2	3.5 ± 0.2	NS <sup>d</sup>
Estimated prostatic weight <sup>b</sup>	28.6 ± 1.3	25.1 ± 2.2	31.6 ± 2.6	28.9 ± 2.8	NS

<sup>a</sup> distance between bladder neck and verumontanum<sup>b</sup> estimated by rectal examination on cystoscope<sup>c</sup> mean ± SE<sup>d</sup> NS = no significant difference**Table 4.** Association between symptoms and urodynamic/cystoscopic findings

	number of irritative symptoms	number of obstructive symptoms
Maximum flow at uroflowmetry	NS <sup>a</sup>	NS
Volume at first sensation	<i>p</i> < 0.05	NS
Bladder capacity	<i>p</i> < 0.05	NS
UDC <sup>b</sup>	<i>p</i> < 0.05	NS
Severity of bladder trabeculation	<i>p</i> < 0.05	NS
BVD <sup>c</sup>	<i>p</i> < 0.05	NS
Estimated prostatic weight <sup>d</sup>	<i>p</i> < 0.05	NS

<sup>a</sup> NS = no significant difference<sup>b</sup> Uninhibited detrusor contractions<sup>c</sup> Distance between bladder neck and verumontanum<sup>d</sup> Estimated by rectal examination on cystoscope

(Table 1), and the urodynamic- and cystoscopic findings in the three groups were compared using two way analysis of variance or Chi-square test. Increasing number of irritative symptoms were associated with decreasing volume at first sensation, decreasing bladder capacity and increasing frequency of UDC, and were associated with increasing bladder trabeculation, BVD and estimated prostatic weight, whereas number of obstructive symptoms showed no association with these parameters.

## Discussion

The frequencies of the different symptoms of prostatism in the present study are in accordance with the results of other studies [2, 9]. Only urge incontinence and the obstructive symptom of poor stream were affected by age. The frequency of the latter symptom decreased with age in spite of decreasing maximum urine flow at uroflowmetry.

Regarding the total number of irritative and obstructive symptoms, the symptoms of bladder instability increased

with age, a finding which was reflected in increasing incidence of UDC and decreasing voided volume, although the degree of prostatic hypertrophy in the three age groups studied were the same. These findings suggest age related changes in the symptomatology and urodynamics in BPH and indicate that age is an important factor in the interpretation of symptoms and objective findings.

Alterations in the nervous system as suggested from urodynamic studies of healthy [4] and also structural changes may be involved, as bladder trabeculation clearly occurred more frequently with age. According to Susset [12] the collagen content of the bladder is influenced by age and by bladder outlet obstruction. The collagen replaces muscle tissue and may be of significance in the development of bladder trabeculation.

The correlation between outlet obstruction per se and bladder trabeculation still is a matter of debate [11]. In the present study an association between prostatic size and trabeculation was found in the oldest age groups only.

The degree of bladder outlet obstruction is often estimated by maximum flow at uroflowmetry. Recent studies, however, have found no correlation between maximum flow and symptoms as well as other clinical parameters of bladder outlet obstruction [2, 11]. The present study did not show any association between maximum flow and symptoms of prostatism. Neither was there any association between obstructive symptomatology and objective parameters obtained at cystoscopy. The irritative symptoms, however, were associated with several objective findings. Thus symptoms of bladder instability were reflected by cystometric parameters of a small and unstable bladder and were associated with the severity of bladder trabeculation and estimated prostatic size.

According to Andersen [3] cystoscopy should be routine in the workup of patients with prostatism assessing morphology and site of bladder outlet obstruction as well as unsuspected bladder pathology. The present results indicate cystoscopy also to be useful in evaluating the degree of bladder instability.

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