

VIDEOURODYNAMIC STUDIES IN MEN WITH LOWER URINARY TRACT SYMPTOMS: A COMPARISON OF COMMUNITY BASED VERSUS REFERRAL UROLOGICAL PRACTICES

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ABSTRACT

Purpose: We compared the clinical and urodynamic characteristics of men referred for evaluation of lower urinary tract symptoms in community based versus referral urological practices and examined the various pathophysiological mechanisms of these symptoms.

Materials and Methods: We reviewed a multicenter urodynamics database of 963 consecutive men referred for the evaluation of persistent lower urinary tract symptoms at 2 community based and 1 urological referral center. Of the 963 patients in the database 422 (44%) were excluded from study due to neurological disorder in 41%, previous urinary or pelvic surgery in 27% and the use of medications known to affect voiding in 24%. A total of 541 patients with a mean age plus or minus standard deviation of 64.4 ± 13.8 years met study inclusion criteria and were analyzed further. We compared the clinical and urodynamic characteristics of patients at the community and referral centers.

Results: Lower urinary tract symptoms were equally common in men presenting to community and referral centers. The most common symptom was difficult voiding, followed by frequency, urgency and nocturia in 58%, 54%, 43% and 40% of the study population, respectively. Urodynamic diagnoses were also similar in the 2 groups. Although bladder outlet obstruction was diagnosed in 69% of patients, it was the only urodynamic finding in a third of the patients with obstruction. The main concomitant urodynamic diagnoses were detrusor overactivity, bladder hyposensitivity, impaired detrusor contractility, low bladder compliance and bladder hypersensitivity in 47%, 10%, 10%, 9% and 3% of obstructed cases, respectively.

Conclusions: The pathophysiology of lower urinary tract symptoms in men is multifactorial, and similar at community practice and tertiary referral centers. The disparity in urodynamic findings and subjective symptoms emphasizes the need for a thorough and early clinical and urodynamic evaluation.

KEY WORDS: urodynamics, urinary tract, urination disorders

The availability and increased use of various treatment modalities have created a greater need to diagnose accurately the etiology of lower urinary tract symptoms in men. Historically lower urinary tract symptoms in men were considered to be associated with bladder outlet obstruction secondary to benign prostatic hyperplasia (BPH). However, previous studies have failed to reveal any significant correlation of lower urinary tract symptoms with BPH, prostatic enlargement or bladder outlet obstruction.^{1–6}

Although urodynamic studies are currently the best method for assessing storage and voiding disorders, debate remains regarding the practical need, appropriate timing and clinical importance of this diagnostic tool for evaluating men with lower urinary tract symptoms.^{2,5,7–9} At most referral centers urodynamics are considered part of the baseline investigation of this condition. However, men presenting to referral centers are traditionally considered select patients who do not necessarily reflect the community population.^{10,11} Therefore, it is controversial whether urodynamics should also be performed in community based practices and whether the primary management of lower urinary tract symptoms should be empirical, symptom based or tailored according to urodynamic findings. We compared the clinical and urody-

dynamic characteristics of men referred for the evaluation of lower urinary tract symptoms in community based versus referral urological practices and examined the various pathophysiological mechanisms of these symptoms.

MATERIALS AND METHODS

Patients. We reviewed a multicenter urodynamics database of 963 consecutive men referred for the evaluation of persistent lower urinary tract symptoms. The centers included 2 community based urological practices where urodynamic studies are regularly performed and 1 referral center. We further evaluated 541 consecutive patients (56%) of the 963 in the urodynamics database, including 126, 276 and 139 from the community and referral centers, respectively. Study exclusion criteria were a neurological disorder known to cause lower urinary tract symptoms, previous lower urinary tract or pelvic surgery, use of medications that affect voiding, acute urinary tract infection, urinary neoplasm or stones and significant co-morbid diseases affecting diurnal and/or nocturnal urine output, such as overt congestive heart failure, diabetes or alcohol abuse.

Investigations. All patients underwent a detailed clinical evaluation involving a complete history and physical examination, urinary questionnaire, the American Urological Association (AUA) symptom index score, 24-hour voiding diary,

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urine analysis and culture, noninvasive free flow uroflowmetry, post-void residual urine and videourodynamics. A 24-hour voiding diary was completed before any further evaluation. Incontinent patients also underwent a concomitant pad test. Before examination all patients voided privately and the free urine flow rate was recorded. Post-void residual urine volume was measured by ultrasound immediately after bladder emptying. The indications for videourodynamic evaluation were lower urinary tract symptoms severe enough to warrant invasive treatment in the opinion of the patient, when advisable, sudden onset urinary incontinence, severe symptoms in men younger than 50 years, failed previous empirical treatment and lower urinary tract symptoms with known hydronephrosis, urinary retention, large post-void residual urine on repeat measurements and/or free urine flow less than 5 ml. per second on repeat measurement.

Multichannel videourodynamics were performed according to the recommendations of the International Continence Society (ICS) except for cystometry.¹² Contrary to the recommendations patients were not instructed to inhibit voiding during the filling phase, but rather to report sensations to the examiner. Cystometrography was performed using radiographic contrast medium and a 7Fr double lumen catheter via constant infusion at a medium fill rate with rectal pressure monitoring. At functional bladder capacity, defined as the maximum voided volume reported in the 24-hour diary, patients were asked to void and pressure flow studies were done with simultaneous videofluoroscopy of the bladder outlet and surface electromyography.

Urodynamic diagnoses. Urodynamic diagnoses were categorized into storage and voiding disorders according to the standards recommended by the ICS.^{12,13} Briefly, storage phase disorders include overactive detrusor function, increased bladder sensation (hypersensitivity), decreased bladder sensation (hyposensitivity) and low bladder compliance. Voiding phase disorders include bladder outlet obstruction, impaired detrusor contractility and acontractile detrusor. Linear passive urethral resistance relation curves were constructed to quantitate bladder outlet obstruction and detrusor contractility.¹⁴ Bladder outlet obstruction was categorized according to these curves as grade 1 or 1—no obstruction, grade 2—equivocal or mild obstruction and grades 3 to 6—increasingly severe obstruction. When patients did not void during urodynamics, they were considered to have obstruction if a sustained detrusor contraction was 40 cm. water or more. Impaired detrusor contractility was defined as detrusor pressure at a maximum flow of 30 cm. water or less and a maximum flow rate of 12 ml. per second or less. In men with equivocal results an overall clinical judgment was made to distinguish bladder outlet obstruction and impaired detrusor contractility.

Statistical analysis. Clinical characteristics and urodynamic diagnoses were analyzed separately and then compared for the 3 participating centers. Because the results for the 2 community based centers were almost identical, they were combined into 1 group for further analysis.

Results were analyzed statistically using the Student t and chi-square tests with p <0.05 considered significant. Data are presented as the mean plus or minus standard deviation or percent according to the variables.

RESULTS

Patient characteristics. A total of 541 men (56% of the database) 26 to 89 years old (mean age 64.4 ± 13.8) met our study inclusion criteria. Excluded from study were 421 other patients (44% of the database) due to neurological disorders in 41%, previous urinary or pelvic surgery in 27% and medications known to affect voiding in 24%. Table 1 lists patient characteristics.

Symptoms. Most patients had mixed storage and voiding

TABLE 1. Patient characteristics

	Community Centers	Referral Center
No. pts.	402	139
Mean age ± SD	67.2 ± 11.8	61.9 ± 15
% Presenting symptoms:		
Difficult voiding	57	58
Frequency	59	50
Urgency	44	43
Nocturia	46	34
Urge incontinence	13	19
Stress incontinence	1	4
Mean AUA symptom score ± SD	15.4 ± 7.7 (p = 0.001)	18.8 ± 7.9

symptoms. Storage and voiding symptoms were equally common in men presenting to community and referral centers. Voiding symptoms included weak or intermittent stream in 58% of cases, hesitancy in 54%, feeling of incomplete emptying in 43% and straining to void in 40%. Storage symptoms included urinary frequency in 58% of cases, urgency in 54% and nocturia in 40%. Urge and stress incontinence was present in 87 (16%) and 10 (2%) men, respectively.

Symptom severity was assessed by the AUA symptom index score. Although presenting symptoms were equally common in men presenting to community and referral centers, the mean AUA symptom score was significantly higher for the referral center (18.8 ± 7.9 versus 15.4 ± 7.7, p = 0.001). Overall a score of 20 to 35 compatible with severe symptoms was observed in 26% and 49% of community based and referral center cases, respectively (p <0.05). A score of 8 to 19 compatible with moderate symptoms was noted in 59% and 39% of community based and referral center cases, respectively.

Voiding diary and pad test. Table 2 shows the results of the 24-hour voiding diary. All examined parameters except nocturnal voiding episodes were similar in the referral and community based populations. The mean number of nocturnal voiding episodes was higher in patients at the referral center (3.1 ± 2.8 versus 2.4 ± 1.6, p = 0.04). The mean urine loss per 24-hour pad test of 59.3 ± 42.9 gm. was similar in incontinent patients at all participating centers.

Uroflowmetry. Table 3 shows the results of free urine flow measurements and post-void residual urine. All examined parameters were similar in referral and community center cases.

Urodynamic diagnoses. Table 4 lists the urodynamic diagnoses. The results were almost identical at all participating centers. Bladder outlet obstruction was evident in 374 patients (69% of the study population), of whom 124 (33%) had bladder outlet obstruction as the only cause of symptoms and 250 (67%) had 1 or more other concomitant urodynamic findings. The main concomitant urodynamic diagnoses were detrusor overactivity, bladder hyposensitivity, impaired detrusor contractility, low bladder compliance and bladder hypersensitivity in 47%, 10%, 10%, 9% and 3% of obstructed cases, respectively. Detrusor overactivity was identified in 252 patients (47% of the study population), of whom 49 (19%) had detrusor overactivity as the only urodynamic finding. Impaired detrusor contractility was diagnosed in 107 patients (20% of the study population), of whom 28 (26%) had

TABLE 2. Results of 24-hour voiding diary

	Community Centers	Referral Center
No. pts.	402	139
Mean functional bladder capacity ± SD (ml.)	318.3 ± 143.1	353.2 ± 212.3
Mean No. episodes ± SD:		
Incontinence	0.7 ± 1.8	0.9 ± 2.5
Diurnal voiding	8.7 ± 2.7	8.8 ± 3.6
Nocturnal voiding	2.4 ± 1.6 (p = 0.04)	3.1 ± 2.8
Mean voided vol. ± SD (ml.)	1,887.5 ± 581.2	1,891.6 ± 757.1

TABLE 3. *Uroflowmetry and post-void residual urine volume measurements*

	Community Centers	Referral Center
No. pts.	402	139
Mean max. flow \pm SD (ml./sec.)	11.3 \pm 7.1	10.8 \pm 7.5
Mean voided vol. \pm SD (ml.)	151.8 \pm 98.9	191.3 \pm 157
Mean post-void residual urine vol. \pm SD (ml.)	103.5 \pm 173.9	132.9 \pm 239.8

TABLE 4. *Urodynamic diagnoses*

	No. Community Centers (%)	No. Referral Center (%)	Totals
No. pts.	402	139	541
Storage phase:			
Overactive detrusor	193 (48)	59 (42)	252 (47)
Bladder hyposensitivity	36 (9)	16 (12)	52 (10)
Low bladder compliance	33 (8)	15 (11)	48 (9)
Bladder hypersensitivity	11 (3)	1 (1)	12 (2)
Voiding phase:			
Bladder outlet obstruction	278 (69)	96 (70)	374 (69)
Impaired contractility	81 (20)	26 (19)	107 (20)
Acontractile detrusor	28 (7)	15 (11)	43 (8)
Normal study	27 (7)	9 (6)	36 (7)

impaired detrusor contractility as the only urodynamic finding.

The incidence of radiographic findings was similar in men evaluated at referral and community centers. Videofluoroscopy performed during bladder filling and emptying revealed an unsuspected bladder diverticulum in 58 patients (11%) and vesicoureteral reflux in 27 (5%). Unsuspected hydronephrosis was diagnosed in 1% of the patients.

DISCUSSION

Lower urinary tract symptoms are common in men, affecting up to 78% of the elderly population.^{1,2} For many years it was believed that lower urinary tract symptoms in men were caused by prostatic urethral obstruction. However, some recent studies failed to reveal any significant correlation of lower urinary tract symptoms with BPH, prostatic enlargement or bladder outlet obstruction.^{3-5,15-17} As our study shows, the underlying pathophysiological abnormalities are multifactorial and approximately a third of the men with lower urinary tract symptoms do not have bladder outlet obstruction. Although bladder outlet obstruction was noted on urodynamics in 69% of our study population, it was the only urodynamic finding in 23%. About two-thirds of obstructed cases involved at least 1 other significant abnormality, including detrusor overactivity in 47%, low bladder compliance in 10%, bladder hyposensitivity in 10% and impaired detrusor contractility in 9%. In addition, unsuspected hydronephrosis, vesicoureteral reflux and/or a bladder diverticulum was present in 1%, 5% and 11% of the study population, respectively.

Currently it is well accepted that urodynamics are the best diagnostic tool for assessing lower urinary tract function. Furthermore, it is the only method to differentiate bladder outlet obstruction and impaired detrusor contractility.¹⁷ However, in an AUA survey only 11% of American urologists reported that they routinely perform urodynamics when evaluating men with lower urinary tract symptoms.¹⁸ Although about 30% of men with lower urinary tract symptoms do not have prostatic obstruction and two-thirds of those with obstruction have at least 1 additional urodynamic finding, many urologists believe that urodynamics are not routinely warranted and they prefer symptom based empirical management.¹⁹ Thus, we believe that many patients are receiving surgical and/or inappropriate long-term medical intervention.

There are a number of reasons why videourodynamic studies are not yet routinely performed. It has been asserted that because previous urodynamic studies showing the multifactorial causation of lower urinary tract symptoms have only been done in highly select men referred to tertiary centers, they are biased and do not represent daily clinical practice. Also, previous studies have shown a lack of association of symptom scores with objective urodynamic findings.^{15,16} If this were true, why perform urodynamics? Furthermore, there is currently a lack of effective therapy for specific abnormalities, such as detrusor overactivity, impaired detrusor contractility and low bladder compliance. In addition, most physicians do not have the interest or expertise to pursue such sophisticated videourodynamic studies. The investigations are labor intensive and expensive, and costs are not adequately covered by many insurance companies. It seems that for most urologists these reasons are adequate not to perform such studies routinely.

Our results show that patients presenting to community based and referral centers for the evaluation of lower urinary tract symptoms have similar clinical and urodynamic characteristics. These data imply that referred patients do not represent a highly select population and those visiting community based clinics may also benefit from early urodynamic evaluation. As clearly shown, the pathophysiology of lower urinary tract symptoms in men is multifactorial. We believe that treating the underlying pathophysiology treats symptoms, which is why urodynamic studies are important. Symptoms reveal to physicians what is bothersome to patients and what requires treatment. Urodynamics define underlying pathophysiology. Even if all patients were treated similarly according to algorithms and empirical therapy, urodynamics are still useful because they enable physicians to understand the effectiveness of specific treatments in specific patients. They help physicians to understand subtle differences among patients and perhaps why some therapies fail and some succeed in individuals. Without urodynamics physicians and patients are denied the opportunity to understand what makes each patient unique. Furthermore, physicians would not have the opportunity to learn from experience.

CONCLUSIONS

The pathophysiology of lower urinary tract symptoms in men is multifactorial. Although bladder outlet obstruction is the most common urodynamic finding, detrusor overactivity, impaired detrusor contractility, low bladder compliance and/or other storage and voiding disorders may coexist. The disparity in urodynamic findings and subjective symptoms as well as the similarity in patients presenting to community based and referral centers emphasize the need for early clinical and urodynamic evaluation. We believe that an accurate diagnosis may enable focused, more efficient treatment in such cases. Today as new therapies emerge, it is likely that various pathophysiologies may be treated differently.

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were performed in a cohort of 541 men with lower urinary tract symptoms. The data confirm the current knowledge on this issue and demonstrate the complexity of the development of lower urinary tract symptoms. They noted bladder outflow obstruction in only 69% of cases, detrusor overactivity in 47%, impaired detrusor contractility in 20%, bladder hyposensitivity in 10% and hypersensitivity in 3%. An important co-factor for the pathogenesis of lower urinary tract symptoms in elderly men, that is chronic urethroprostatitis or prostatitis-like symptoms, was not considered. The urodynamics data emphasize the need for a proper diagnosis in elderly men with this condition in the era of multiple treatment options. However, despite this knowledge only 11% of American urologists routinely perform urodynamics when evaluating men with lower urinary tract symptoms. This skepticism is primarily grounded on the lack of prospective randomized blinded studies, which are urgently needed to determine the definitive place of urodynamics in the diagnostic evaluation of men with lower urinary tract symptoms.

The role of videourodynamics in the evaluation of lower urinary tract symptoms is even more controversial and the large database of the authors may help to answer this question. In their study simultaneous imaging revealed a bladder diverticulum in 11% of cases and vesicourethral reflux in 5%. Although the authors did not specify their definition of bladder diverticulum, this rather high percent suggests a select study population. Unfortunately the authors did not report whether these incidental imaging findings altered the therapeutic approach. Such information would be valuable for practicing urologists who usually perform pressure flow studies without imaging as well as for third party payers.

The second major conclusion that the pathophysiology of lower urinary tract symptoms is similar in men treated in community practices and tertiary referral centers must be interpreted with caution. Although urodynamic findings were identical in the 2 groups, referral patients had a higher AUA symptom score and higher degree of nocturia but were an average of almost 6 years younger. Also, one may speculate that community practice oriented physicians who perform videourodynamics do not represent a cross section of the general community. In addition, the authors did not study a consecutive series of patients referred for lower urinary tract symptoms, but instead a consecutive series of videourodynamics. Because some of the indications for urodynamics were rather vague, such as lower urinary tract symptoms that in the opinion of the patient were severe enough to warrant invasive treatment, a selection bias cannot be excluded. Only a prospective study of an unselected population with lower urinary tract symptoms may determine whether patients with persistent lower urinary tract symptoms referred to a tertiary care center are similar to those treated by community based care physicians.

Despite these shortcomings this article provides important insights into the development of lower urinary tract symptoms in elderly men, represents one of the largest series of videourodynamics for this indication and to my knowledge is the first to attempt a comparison of lower urinary tract symptoms/urodynamics in community based versus referral urological practices.

EDITORIAL COMMENT

The principal aims of this study were to compare the clinical and urodynamic characteristics of men with lower urinary tract symptoms in community based versus referral practices and examine the various pathophysiological mechanisms leading to these symptoms in elderly men. The latter objective was met since videourodynamics

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