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DETRUSOR INSTABILITY IN MEN: CORRELATION OF LOWER URINARY TRACT SYMPTOMS WITH URODYNAMIC FINDINGS

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ABSTRACT

Purpose: We evaluated the correlation of lower urinary tract symptoms suggestive of detrusor instability with urodynamic findings in men.

Materials and Methods: Enrolled in our prospective study were 160 consecutive neurologically intact men referred for urodynamic evaluation of persistent lower urinary tract symptoms. All patients had storage symptoms suggestive of detrusor instability. Patients were further clinically categorized according to the chief complaint of urge incontinence, frequency and urgency, nocturia or difficult voiding. The clinical and urodynamic diagnosis in all patients as well as specific urodynamic characteristics of those with detrusor instability were analyzed according to the these 4 clinical categories.

Results: Mean patient age was 61 ± 15 years. The chief complaint was urge incontinence in 28 cases (17%), frequency and urgency in 57 (36%), nocturia in 30 (19%) and difficult voiding in 45 (28%). Detrusor instability was diagnosed in 68 cases (43%). A higher incidence of detrusor instability was associated with urge incontinence than with the other clinical categories (75% versus 36%, $p < 0.01$). Of the patients 109 (68%) had bladder outlet obstruction, including 50 (46%) with concomitant detrusor instability. The prevalence of bladder outlet obstruction was similar in all patients regardless of the chief complaint. All other urodynamic diagnoses were also similar in the 4 clinical categories. The mean bladder volume at which involuntary detrusor contractions occurred were lower in patients with urge incontinence and frequency and urgency than in those with nocturia and difficult voiding (277.1 ± 149.4 and 267.7 ± 221.7 versus 346.7 ± 204.6 and 306.2 ± 192.1 ml., respectively, not statistically significant, $p = 0.07$).

Conclusions: Detrusor instability and bladder outlet obstruction are common in men with lower urinary tract symptoms. The symptom of urge incontinence strongly correlated with detrusor instability. Other lower urinary tract symptoms did not correlate well with any urodynamic findings. Therefore, we believe that an accurate urodynamic diagnosis may enable focused and more efficient management of lower urinary tract symptoms in men.

KEY WORDS: bladder, urodynamics, urinary incontinence, bladder neck obstruction

The pathophysiology of lower urinary tract symptoms in men is not well characterized. Until recently lower urinary tract symptoms in men were traditionally attributed to bladder outlet obstruction secondary to prostate enlargement or benign prostatic hyperplasia. However, recent studies have failed to reveal any significant correlation of lower urinary tract symptoms with bladder outlet obstruction.[1–6] In addition, although urinary frequency and urgency or urge incontinence are usually considered to be associated with overactive detrusor function, data supporting this hypothesis are scarce.[7,8] We evaluated the correlation of lower urinary tract symptoms suggestive of overactive detrusor function with objective urodynamic findings.

MATERIALS AND METHODS

Our study population included 160 consecutive men in whom history was indicative of detrusor instability. Storage symptoms suggestive of detrusor instability included urinary frequency, and urgency and/or urge incontinence. All patients underwent a detailed clinical evaluation, including history, physical examination, urinary questionnaire, American Urological Association symptom index score, 24-hour voiding diary and pad test, urinalysis, urine culture, noninvasive free flow uroflowmetry, post-void residual urine volume measurement and video urodynamics.

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Multichannel video urodynamics were performed according to the recommendations of the International Continence Society except for cystometry.[9] Contrary to these 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 material 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 performed with simultaneous video fluoroscopy of the bladder outlet and surface electromyography measurement.

We analyzed 8 urodynamic parameters of involuntary detrusor contractions, including bladder volume at contraction, cystometric capacity, ratio of bladder volume at contraction-to-cystometric capacity, detrusor pressure and urinary incontinence during the contraction, patient awareness of and ability to abort the contraction, and patient ability to stop the incontinence flow via contraction of the external sphincter.

All patients had storage symptoms suggestive of detrusor instability. Cases were further divided into clinical categories according to the chief complaint of urge incontinence, frequency and urgency, nocturia and difficult voiding. Urge incontinence was defined as involuntary urine loss associated with a strong desire to void. Frequency and urgency

were defined as 7 or more episodes of daytime voiding and the sudden strong desire to void accompanied by fear of leakage, respectively. Nocturia was defined as 2 or more episodes of nighttime voiding in which the patient is awakened by the desire to void. Difficult voiding was defined as hesitancy, an intermittent or weak urinary stream, incomplete emptying or straining.

The clinical and urodynamic diagnosis in all patients as well as the urodynamic characteristics of those with detrusor instability were analyzed according to these 4 clinical categories. Results were analyzed statistically by the Student's 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

Enrolled in our prospective study were 160 consecutive neurologically intact men with a mean age of 61 ± 15 years who had persistent lower urinary tract symptoms. Of the 160 patients 28 (17%) had urge incontinence, 57 (36%) had frequency and urgency, 30 (19%) had nocturia and 45 (28%) had difficult voiding as the chief complaint. Table 1 lists patient characteristics according to the chief complaint. Men presenting with the chief complaint of difficult voiding were significantly younger than all others (mean age 56.4 ± 16.5 versus 63.1 ± 14.0 years, respectively, $p = 0.02$) and had greater mean post-void residual urine (312 ± 405 versus 177.8 ± 331.0 ml., $p = 0.02$). All other patient characteristics were similar in the 4 clinical categories.

Table 2 shows the analysis of urodynamic diagnoses according to the patient chief complaint. Of the study population 68 patients (43%) had detrusor instability. A statistically significant higher incidence of detrusor instability was associated with urge incontinence than with the other 3 clinical categories (75% versus 36%, $p < 0.01$). In addition, men with urge incontinence were less likely to have impaired detrusor contractility during pressure flow studies (11% versus 32%, $p < 0.01$). Further comparison of urge incontinence with an unstable or stable detrusor failed to reveal any statistically significant difference.

Urodynamics revealed bladder outlet obstruction in 109 patients (68%), including 50 (46%) with concomitant detrusor instability. The prevalence of bladder outlet obstruction was similar in all patients regardless of the chief complaint. All other urodynamic diagnoses were also similar in the 4 clinical categories.

Table 3 shows the analysis of urodynamic parameters of involuntary detrusor contractions according to the patient chief complaint. Overall there were involuntary detrusor contractions at approximately 80% of cystometric capacity in all 4 clinical categories. The mean bladder volume at which contractions occurred was lower in patients with urge incontinence, and frequency and urgency than in those with nocturia and difficult voiding (277.1 ± 149.4 and 267.7 ± 221.7 versus 346.7 ± 204.6 and 306.2 ± 192.1 ml., respectively, not statistically significant, $p = 0.07$).

DISCUSSION

Lower urinary tract symptoms in men are common, affecting up to 78% of the elderly population.[10] In our experience the 2 main causes of lower urinary tract symptoms in men are bladder outlet obstruction and/or detrusor overactivity (69% and 47%, respectively).[11] Previous studies have failed to reveal any correlation of lower urinary tract symptoms with bladder outlet obstruction.[1–6] However, data on the relationship of lower urinary tract symptoms with detrusor instability in men are scarce. The results of our study show a strong correlation of the symptom of urge incontinence with detrusor instability. However, we observed no correlation of other lower urinary tract symptoms with clinical or urodynamic findings.

Men presenting with the symptoms of urgency and urge incontinence have typically been diagnosed with detrusor instability, although data supporting this correlation are scarce and controversial. Others have reported that storage symptoms correlate well with overactive bladder and it has also been reported that the triad of urgency, frequency and urge incontinence is associated with an overactive detrusor in up to 90% of cases.[7,8] However, other studies have failed to confirm such a strong correlation.[12–14] Recently Ameda et al evaluated lower urinary tract symptoms in neurologically intact men without obstruction.[14] While more than half of the patients had detrusor instability, symptoms did not correlate with the urodynamic diagnosis. In our series only the symptom of urge incontinence and the urodynamic diagnosis of detrusor instability correlated strongly. Of the men with urge incontinence 75% had detrusor instability compared with 36% of those who were continent patients ($p < 0.01$). Furthermore, although the average number of incontinence episodes per 24-hour voiding diary was similar in all incontinent patients regardless of the presence or absence of involuntary detrusor contractions, mean urinary loss was significantly greater in those with detrusor instability (265 ± 146 versus 43 ± 56 gm.).

In 1985 Coolsaet proposed a standard method for evaluating detrusor overactivity, in which detrusor pressure during involuntary detrusor contraction, bladder volume at which the contraction occurs, patient awareness of and ability to abort the contraction, the presence or absence of urinary incontinence during the contraction and patient ability to abort contraction related incontinent flow are assessed.[15] We used this method to assess the urodynamic characteristics of involuntary detrusor contractions according to the chief complaint. Overall there were involuntary detrusor contractions in all 4 clinical categories at approximately 80% of cystometric capacity. The mean bladder volume at which contraction occurred was lower in patients with urge incontinence, and frequency and urgency than in those with nocturia or difficult voiding (277.1 ± 149.4 and 267.7 ± 221.7 versus 346.7 ± 204.6 and 306.2 ± 192.1 ml., respectively), although statistical significance was not established ($p = 0.07$). All other urodynamic parameters were similar in the patients. However, as suggested by Romanzi et al, the urodynamic charac-

TABLE 1. *Patient characteristics according to chief complaint*

	Urge Incontinence	Frequency-Urgency	Nocturia	Difficult Voiding
No. pts.	28	57	30	45
Mean age ± SD	61.6 ± 17.2	62.6 ± 12.2	62.1 ± 14.7	56.4 ± 16.5 ($p < 0.05$)
Mean American Urological Association symptom score ± SD	18.9 ± 8.9	21.3 ± 7.9	20.8 ± 6.0	20.4 ± 6.2
Mean 24-hr. voiding diary ± SD:				
No. daytime voiding episodes	8.2 ± 2.5	10.6 ± 4.3	7.9 ± 3.8	6.5 ± 3.8
No. nighttime voiding episodes	3.0 ± 1.3	4.1 ± 2.2	4.3 ± 3.5	3.4 ± 1.7
Functional bladder capacity (ml.)	299.8 ± 155.7	313.5 ± 166.4	387 ± 230.1	383.8 ± 172.3
Mean max. flow ± SD (ml./sec.)	11.2 ± 7.1	10.5 ± 6.9	10.0 ± 6.3	12.7 ± 9.8
Mean post-void residual urine vol. ± SD (ml.)	76.0 ± 78.3	130.8 ± 187.5	329.5 ± 543.5	312.4 ± 405.6 ($p < 0.05$)

Urge incontinent patients had mean 2.2 ± 3.5 incontinence episodes on 24-hour voiding diary and mean 173.1 ± 380.4 gm. urine lost on 24-hour pad test.

TABLE 2. *Urodynamic diagnosis according to chief complaint*

	No. Urge Incontinence (%)	No. Frequency-Urgency (%)	No. Nocturia (%)	No. Difficult Voiding (%)
Overall	28	57	11	45
Storage phase:				
Detrusor instability	21 (75) ($p < 0.05$)	25 (44)	11 (37)	11 (24)
Low bladder compliance	1 (4)	6 (11)	2 (7)	5 (11)
Bladder hyposensitivity	1 (4)	2 (4)	1 (3)	1 (2)
Bladder hypersensitivity	0	4 (7)	4 (13)	0
Voiding phase:				
Bladder outlet obstruction	19 (68)	43 (75)	21 (70)	26 (58)
Impaired contractility	3 (11) ($p < 0.05$)	18 (32)	5 (17)	19 (42)
Normal study	1 (4)	3 (5)	1 (3)	1 (2)

TABLE 3. *Urodynamic parameters of involuntary detrusor contractions according to chief complaint*

	Urge Incontinence	Frequency-Urgency	Nocturia	Difficult Voiding
Mean vol. at contraction ± SD (ml.)	277.1 ± 149.4	267.7 ± 221.7	346.7 ± 204.6	306.2 ± 192.1
Mean cystometric capacity ± SD (ml.)	346.8 ± 144.5	351.4 ± 237.0	436.0 ± 290.9	385.0 ± 285.1
% Bladder vol. at contraction/cystometric capacity	80	76	79	79
Mean detrusor pressure during contraction ± SD (cm. water)	64.0 ± 28.8	69.0 ± 38.2	77.3 ± 45.2	40.1 ± 31.3
No. aware of contraction/total No. (%)	20/21 (95.2)	25/25 (100)	10/11 (90.1)	8/11 (72.7)

teristics of involuntary detrusor contractions may serve as a screening process for therapeutic options.[16] Common sense would support the concept that patients who stop incontinent flow and abort involuntary detrusor contractions voluntarily may fare well with bladder retraining, pelvic floor exercise and behavior modification only, while those who stop the flow but cannot abort involuntary detrusor contractions may require anticholinergic medication to achieve continence. Therefore, the true usefulness of urodynamic evaluation may involve the assessment of these parameters rather than in the mere documentation of the presence or absence of detrusor instability.

Detrusor instability in men may be the only urodynamic finding but it is often associated with concomitant bladder outlet obstruction.[17] We have recently reviewed the urodynamic diagnosis in a large series of men referred for the urodynamic evaluation of lower urinary tract symptoms.[11] Bladder outlet obstruction was the most common urodynamic finding, occurring in 69% of the study population. Approximately half of the patients with obstruction also had detrusor instability. In our current series 68% of the patients had bladder outlet obstruction, of whom 46% had concomitant detrusor instability. The prevalence of bladder outlet obstruction was similar in all cases regardless of the chief complaint. This finding again emphasizes the well documented lack of a correlation of lower urinary tract symptoms with bladder outlet obstruction.[1–6] Further investigation is needed to explore the causal relationship of detrusor instability and bladder outlet obstruction in men.

CONCLUSIONS

Detrusor instability and bladder outlet obstruction are common in men with lower urinary tract symptoms. We noted a strong correlation of the symptom of urge incontinence with detrusor instability. Other lower urinary tract symptoms did not correlate well with our urodynamic findings. Although further investigation is needed to explore the causal relationship of detrusor instability, bladder outlet obstruction and other urodynamic findings, we believe that an accurate urodynamic diagnosis may enable focused and more efficient management of lower urinary tract symptoms in men.

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EDITORIAL COMMENTS

The authors report a study of 160 consecutive neurologically intact men with persistent lower urinary tract symptoms who were evaluated with urodynamics. A 75% incidence of the detrusor instability was found in patients who had a chief complaint of urge incontinence. This percentage of detrusor instability was statistically significantly higher than was found in the other three groups who had chief complaints of frequency/urgency, nocturia and voiding difficulties. I believe it is intuitive that patients with urge incontinence should have the highest incidence of detrusor instability. In fact most patients with the symptom of urge incontinence probably experience detrusor instability at the time they are urge incontinent. It is possible that the lack of detrusor instability in 25% of urge incontinent men reflects a lack of sensitivity of the cystometrogram and that the true incidence of detrusor instability in urge incontinent patients is higher than 75%. For years we have argued that cystometrogram is not sensitive enough to detect detrusor instability in women with urge incontinence (that is there is only about a 50% detection rate), and the same is probably true for men. The authors have concluded that the incidence of detrusor instability is higher in patients with urge incontinence compared to the other 3 clinical categories. However, the way it is presented we must assume that no patient with a chief complaint of frequency/urgency, nocturia or voiding difficulties had urge incontinence as a secondary complaint. In my experience men with a chief complaint of frequency and urgency will often complain of a lesser degree of urge incontinence that is not the chief complaint. It would be interesting to see the urodynamic findings in those patients. In other words, analyze the data according to the presence or absence of the symptom of urge incontinence and not just whether or not that symptom is the chief complaint.

The authors make the statement that "common sense" would support the concept that patients who are able to stop incontinent flow and abort involuntary detrusor contractions voluntarily may fare well with bladder retraining, pelvic floor exercises and behavioral modification alone, while those who are unable to do this might require anticholinergic medication. They suggest that urodynamics might help find these patients. While this may be true, it is unproven. I believe that the true value of urodynamic testing in urge incontinent males is to determine those who are obstructed versus those who are not. I would apply "common sense" to say that men with urge incontinence probably have detrusor instability but treatment will be affected by whether or not obstruction is present. I agree with the authors' final statement that, although further investigation is needed to explore the causal relationship between detrusor instability bladder outlet obstruction and other urodynamic findings, an accurate urodynamic diagnosis enables a focused, efficient management of lower urinary tract symptoms. However, I believe that obstruction and not detrusor instability is the urodynamic finding that most greatly influences treatment.

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This article contains data that have been immaculately collected by one of the true experts in the business. I do think that those who read the article, however, would want to know the answers to the following questions.

1) Since 25% of the patients with urge incontinence did not show phasic involuntary bladder contractions, what do the authors think caused the urge incontinence episodes? In other words, to me this is a measure of the error rate of expertly done urodynamics in detecting involuntary bladder contractions in patients who complain of urge incontinence. To me, if a patient complains of urge incontinence and the cystometrogram does not show involuntary bladder contractions, I treat the patient as if he had have involuntary bladder contractions. I assume that I just did not demonstrate the involuntary bladder contraction, and I assume that if I did perform ambulatory urodynamics, I probably would demonstrate evidence of urodynamic detrusor overactivity.

2) What about the 24% of patients who did have involuntary bladder contraction but who complained of voiding difficulties of hesitancy, intermittent or weak stream, incomplete emptying, or straining? Presumably, because of the way the authors divided the groups, these patients did not have frequency/urgency/urge incontinence/nocturia. Were they at all symptomatic in daily lives because of the involuntary bladder contractions? It does not sound to me as though they were and, if not, then this to me is a measure of the error rate (false-positives) of expertly done urodynamics for detecting involuntary bladder contraction in an over age 50 population with symptoms that are not compatible with the involuntary bladder contractions detected. Would anyone treat these patients for involuntary bladder contractions, expecting the primary symptoms to disappear? I am sure some people would.

Do not get me wrong. I think that urodynamics are an extremely valuable tool in assessing and guiding treatment for lower urinary tract symptoms. However, the most important urodynamic instrument is that which allows the integration of urodynamic data with the overall clinical picture, and that is the instrument between your ears. I am sure that the 2 senior authors would agree.

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