

## Urodynamic Evaluation of Patients With Chronic Pelvic Pain Syndrome

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### ABSTRACT

**INTRODUCTION:** The purpose of the investigation was to conduct urodynamic evaluation on patients with chronic pelvic pain syndrome (CPPS) and thus define a specific urodynamic profile that might add to the pathophysiology of the syndrome. This profile may also aid definitive treatment.

**METHODS:** Participants were 34 men with mean age 34.2 (SD = 8.5; range, 24-45 years). All patients presented with symptoms of chronic prostatitis (eg, dysuria, frequency of micturition, burning perineal sensation, lower abdominal discomfort and/or suprapubic pain). They were classified as having CPPS after excluding prostatic infection by standard bacteriological methods. The patients were then evaluated with urodynamic measures including free-flow rate, filling (water) cystometry, a pressure-flow study of micturition, and electromyography of the external urethral sphincter.

**RESULTS:** Of the 34 total patients, 22 (64.7%) had a low mean Qmax of  $10.4 \pm 1.6$  mL/s (range, 4-14 mL/s); 25 (73.5%) had a first sensation of filling and 27 (79.4%) a first desire to void at low volumes (<150 and < 250, respectively). Nine patients (26.5%, 7 obstructed and 2 unobstructed) had idiopathic detrusor overactivity. Regarding pressure-flow measures, 25 (73.5%) had an obstructive pattern of micturition, as defined by a low Qmax of  $9.7 \pm 1.44$  mL/s, a high intravesical pressure at maximum flow of  $87.4 \pm 4.5$  cmH<sub>2</sub>O, and an increased opening intravesical pressure of  $76.7 \pm 4.5$  cmH<sub>2</sub>O. The EMG of the external sphincter was normal in all patients.

**CONCLUSION:** A significant proportion of the patients with CPPS had a particular urodynamic pattern of functional infravesical obstruction and sensory bladder deficit.

**KEYWORDS:** Urodynamic; Chronic pelvic pain syndrome

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### INTRODUCTION

Patients with chronic pelvic pain syndrome (CPPS) have symptoms compatible with one of the two forms of chronic prostatitis (bacterial and nonbacterial), but the expressed prostatic secretion (EPS) is not purulent and its culture is negative for bacteria and other micro-organisms. Despite no evidence of prostatic inflammation, patients in this category often have the most persistent and chronic symptoms [1].

The predominant symptom in many studies is pain, which was most commonly localized to the perineum, suprapubic area, and penis, but can also occur in the testes, groin, or lower back. A prominent feature in many patients is pain during or after ejaculation. Irritative and obstructive voiding symptoms (eg, urgency, frequency, hesitancy, and poor or interrupted flow) are also associated with this syndrome. Erectile dysfunction is reported in patients with CPPS, but it is not a pathognomonic feature of this syndrome [2-4].

The etiology of the syndrome remains obscure and various theories have been proposed (eg, external sphincter spasm, tension myalgia of the pelvic floor, and an unstable bladder). Most patients have symptoms for months to several years [5]. The initiator of the inflammatory process could be a local infection, chemical irritation, dysfunctional voiding, intraductal reflux, neuromuscular disturbances, or an immunological process. There may be an etiological link between Category III prostatitis and interstitial cystitis (IC). The pathogenesis is not entirely certain. Regardless of the triggering factor, the resultant inflammatory process causes tissue edema and increased intraprostatic pressure, leading to local hypoxia and varied mediator-induced tissue damage. This leads to altered neurotransmission in sensory nerve fibers, which causes the pain and other symptoms associated with the condition [6]. The impact of this disorder on health status is significant. The quality of life of many patients diagnosed with CPPS is impaired [7].

The aim of the present study was to evaluate patients diagnosed as having CPPS, to define a specific urodynamic pattern that might explain the pathophysiology of the syndrome. The results are expected to help treat these patients more specifically and possibly more efficiently.

## METHODS

### Participants

The participants were 34 men with a mean age of 34.2 years (SD = 8.5; range, 24-45 years). All of the patients presented with symptoms of chronic prostatitis: dysuria, frequency of micturition, burning perineal sensation, lower abdominal discomfort, suprapubic pain, and/or pain during or after ejaculation.

All patients were classified as having chronic pelvic pain syndrome (CPPS). Patients with infection were excluded. Localization cultures using the Meares-Stamey technique for gram-negative bacteria, chlamydia trachomatis, and ureaplasma urealyticum were negative and microscopy of EPS showed < 10 white blood cells per high-power field [1]. The patients had no *confirmed* previous infection, although most of them had prior unsuccessful treatments with antibiotics for *suspected* infection.

All patients underwent a routine urological evaluation, including prostate-specific antigen (PSA) estimation, digital rectal examination (DRE), urinary tract ultrasonography with residual urine determination, and cystourethroscopy with urine cytology. These tests were conducted to exclude occult urinary

tract pathology such as prostate cancer, bladder cancer, urinary lithiasis or anatomical infravesical obstruction that can present with symptoms similar to CPSS. The patients also underwent a thorough neurological evaluation to exclude any neurological deficit affecting the lower urinary tract.

### Procedures

Prior to urodynamic investigation, medication that could potentially affect lower urinary tract function was discontinued whenever possible for at least 48 hours. None of the patients were on alpha-blocker or anticholinergic drugs at the time of the urodynamic study.

All patients had a complete urodynamic evaluation which included: (1) measurement of free-flow rate (the mean of 3 consecutive free flow trials); (2) resting water cystometry at 100 mL/min; (3) a pressure flow study of micturition; and (4) EMG of the external urethral sphincter using anal surface electrodes (patch electrodes). During the pressure flow study the patients voided while sitting or standing, according to their preference. The maximum flow rate (Q<sub>max</sub>) and the detrusor voiding pressure at Q<sub>max</sub> were recorded for each patient according to the ICS guidelines [8], to classify any obstruction. Any idiopathic detrusor overactivity during cystometry was also recorded.

All of the urodynamic tests were done under the same circumstances using the Uridine 5500 (Dantec, Skovlunde, Denmark). Detrusor underactivity was defined by weak detrusor contractions (< 30 cmH<sub>2</sub>O) and a catheterized urine flow of < 12 mL/s.

## RESULTS

Table 1 contains the mean, SD, and range of uroflowmetry (Q<sub>max</sub>) for all patients. Of the 34 patients, 22 had Q<sub>max</sub> below the normal value for patients younger than 45 years. Twelve patients had Q<sub>max</sub> values in the normal range. The normal value is >15 mL/s for voided volume of > 200 mL.

Table 2 contains the results of filling cystometry and pressure-flow studies. During filling cystometry, 25 patients had a first sensation of filling, and 27 had a first desire to void at low volumes (<150 and < 250, respectively). Nine patients (7 of them obstructed and 2 unobstructed) had idiopathic detrusor overactivity. Regarding the pressure-flow pattern, 25 patients had an obstructive pattern of micturition, as defined by a low Q<sub>max</sub> of 9.7 ± 1.44 mL/s, a high intravesical pressure at maximum flow of 87.4 ± 4.5 cmH<sub>2</sub>O, and an increased opening intravesical pressure of 76.7 ± 4.5 cmH<sub>2</sub>O. The remaining 9 patients had normal pressure-flow patterns.

Table 1. Uroflowmetry Maximum Free-Flow Rate (Qmax) for Patients with Chronic Pelvic Pain Syndrome (N = 34). doi: 10.3834/uij.1944-5784.2009.06.08t1

Category	Patients		Maximum Free-Flow Rate		
	n	% of N	Mean	SD	Range
<b>Abnormal Values (&lt; 15mL/s)</b>	22	64.7	10.4	1.6	4-14
<b>Normal Values (&gt;15mL/s)</b>	12	35.3	15.9	2.3	15-32

The EMG of the external sphincter was normal in all patients. The postvoiding residual volume estimated by ultrasound and by catheter at the end of the urodynamic study was < 50 mL in all patients, even the obstructed group. Figure 1 and Figure 2 contain examples of a normal pressure-flow study with normal EMG and a pressure-flow study with an obstructive pattern of micturition, respectively. No cases of detrusor underactivity or acontractile detrusor were detected.

## DISCUSSION

Chronic pelvic pain syndrome causes symptoms similar to those of chronic prostatitis, but is characterized by negative prostatic fluid cultures and no evidence of inflammation. The diagnosis is made mainly by exclusion and does not rely on positive clinical and laboratory findings. The etiology of the syndrome remains obscure. Many theories have been proposed, such as detrusor-sphincter dyssynergia, tension myalgia of the pelvic floor, or sympathetically-mediated spasm of the external urethral sphincter [5,9]. Other authors have reported that patients are significantly more anxious [10], but it is unclear if anxiety is the cause of the syndrome or if the persistent symptoms lead to the underlying anxiety neurosis [11]. The bladder outlet and urethral spasm have been implicated in the etiology of the syndrome. Meares [9] proposed that a transient spasm of uncertain cause may lead to urinary reflux into the prostatic ducts, and stated that the spasm is then followed by prostatic inflammation. Hellstrom et al [11] described 3 patients with chronic pelvic pain syndrome who had elevated pressures within the prostatic urethra and intraprostatic reflux of urine

detected on voiding cysto-urethrography. Reflux of urine into the prostatic ducts has also been implicated by others as a cause of prostatic symptoms [12]. The present results indicate that a significant proportion of the patients with clinical CPPS had low free-flow rates. Additionally, the results of the pressure-flow study for 25 of the 34 patients showed an obstructive pattern of micturition with functional obstruction at the level of the bladder neck. Anatomical infravesical obstruction was excluded by urethroscopy as part of the routine evaluation. A sympathetically-mediated contraction of the bladder neck during voiding seemed a reasonable pathophysiological explanation for the functional obstruction, and is supported by the beneficial effect of  $\alpha$ -blockers in such patients [13].

Nine patients in the present study (7 obstructed; 2 unobstructed) had idiopathic detrusor overactivity. Turner-Warwick [14] reported a 10% incidence of idiopathic detrusor overactivity in the normal population. Murnaghan and Millard [15] reported a significant incidence of idiopathic detrusor overactivity, equally distributed between patients with and without obstruction.

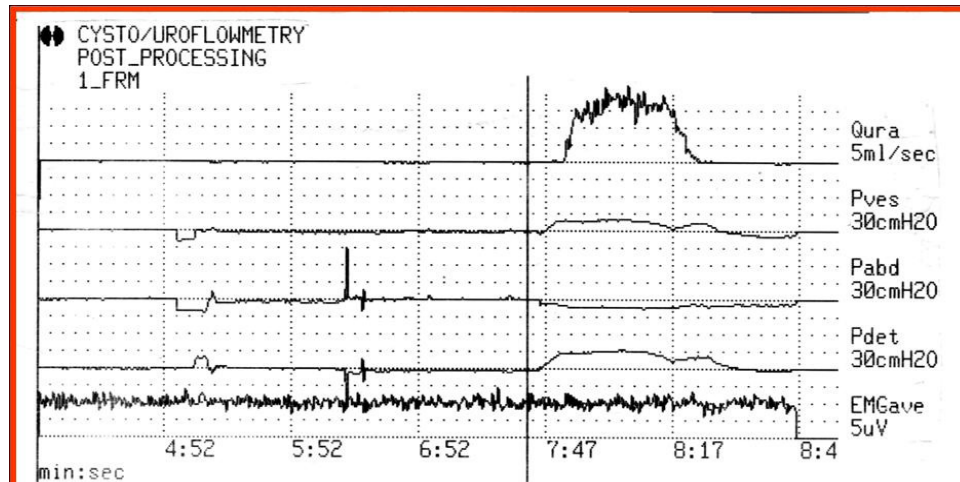
During filling cystometry, two-thirds of the present patients had a first sensation and desire to void at significantly lower volumes than normal. This may partly explain their symptoms of frequency, urgency, and nocturia. Similar sensory problems have been reported by other authors [4]. Urethral constriction at the level of the external sphincter has been found in patients with CPPS who were evaluated using combined video-urodynamics [5]. The authors suggested sympathetically-mediated dyssynergia, as described by others, but all of their

Table 2. Filling Cystometry and Pressure-Flow Studies for Patients with Chronic Pelvic Pain Syndrome (N=34). doi: 10.3834/uij.1944-5784.2009.06.08t2

Cystometric Variable	Abnormal Values			Normal Values		
	Parameter	n	% of N	Parameter	n	% of N
<b>First Sensation of Filling</b>	<150 mL	25	73.5	>150 mL	9	26.5
<b>First Desire to Void</b>	<250 mL	27	79.4	>250 mL	7	20.6
<b>Idiopathic Detrusor Overactivity</b>		7	20.6		2	5.9
<b>Pressure-Flow Pattern</b>	Obstructive	25	73.5	Normal	9	26.5

Figure 1. Normal Pressure-Flow Study with Normal EMG: Intravesical Pressure (Pves); Intra-abdominal Pressure (Pabd); Detrusor Pressure (Pdet).

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patients had clinically detectable neurological impairment [16]. In the present study, EMG of the external sphincter was normal for all patients during both filling and voiding. Thus, detrusor-sphincter dyssynergia or a contracted sphincter should not be expected to contribute to the etiology of the syndrome, at least for patients in the present study.

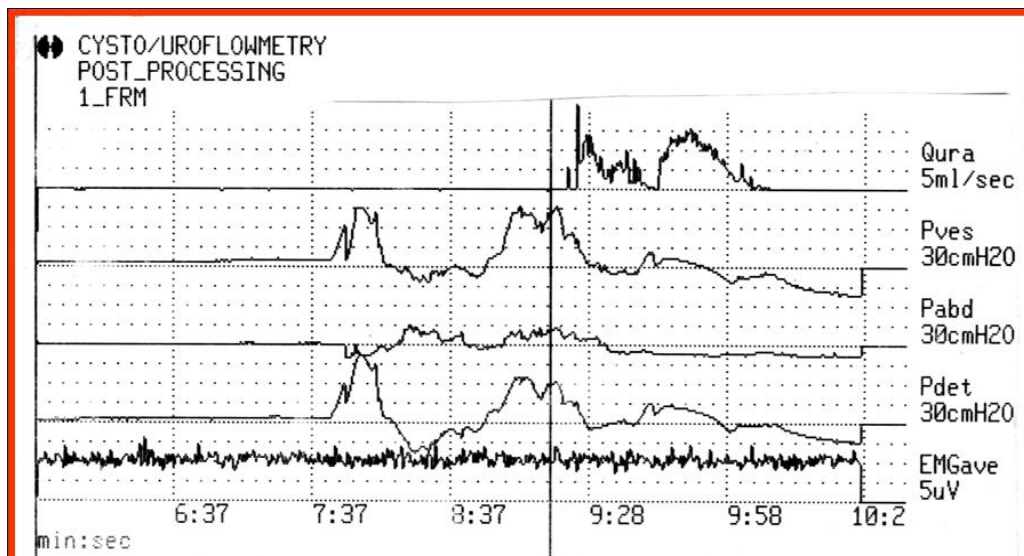
## CONCLUSIONS

The results of the present investigation indicate that the main urodynamic features in patients with CPPS are: (1) functional

obstruction at the level of the bladder neck, and (2) a high sensitivity during filling cystometry. After excluding infection, patients with symptoms of chronic prostatitis should undergo a detailed urodynamic evaluation to confirm the diagnosis. They can then be treated specifically for this disorder. Because patients with CPPS are difficult to treat, the authors recommend that alpha blockers, analgesics, muscle relaxants, and tricyclic antidepressants be used concurrently to ameliorate symptoms.

Figure 2. Pressure-Flow Study With an Obstructive Pattern of Micturition: Intravesical Pressure (Pves); Intra-abdominal Pressure (Pabd); Detrusor Pressure (Pdet).

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