Urodynamic Assessment in Adults Suffering of Persistent Lower Urinary Tract Symptoms Only, a Retrospective Study

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Abstract

Aim of the Work: Evaluation of the urodynamic findings in adults suffering from persistent lower urinary tract symptoms (LUTS), and otherwise normal clinical findings.

Patients and Methods: 30 men patients with storage and voiding lower urinary tract symptoms (LUTS) and otherwise normal clinical findings were assessed in our study by uroflowmetry, filling cystometry and pressure-flow studies. The exclusion criteria were urinary tract infections, diabetes mellitus, bladder outflow obstruction, neuropathies, urinary stones or neoplasm, or any other condition or any drug treatment possibly affecting bladder functions.

Results: Of the 30 adult men referred to our urodynamic unit suffered from LUTS and otherwise normal clinical findings, detrusor underactivity on pressure-flow studies could be confirmed.

Conclusions: Urodynamic studies are worthy in these group of patients to identify detrusor underactivity and hence can be treated and solved their problems.

Key Words: Urodynamic – Detrusor underactivity.

Introduction

ACCORDING to international continence society, Detrusor underactivity (DUA) is defined as a contraction of reduced strength and/or duration resulting in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span [1]. 10-20% of all men with low flow have a degree of Detrusor underactivity (DUA).

DUA cannot be diagnosed by lower urinary tract symptoms (LUTS) or flow rates alone but only by pressure-flow study (PFS), and a similar prevalence of DUA can be found in most age groups [2].

Most of cases of DUA are neurogenic, or secondary to long-lasting condition of bladder outlet obstruction (BOO) usually from BPH, however, men with otherwise normal clinical findings in whom idiopathic DUA could be diagnosed urodynamically by lowered detrusor contraction strength.

Patients and Methods

Of the adult men referred to our urodynamic unit during the period 2002 to 2009 for storage and voiding LUTS, nearly 30% had DUA. In approximately 45% of the cases, DUA was neurogenic, whereas in another 45% it was secondary to long-lasting condition of bladder outlet obstruction (BOO) usually from BPH. The remaining 10% were men with otherwise normal clinical findings in whom idiopathic DUA could be diagnosed urodynamically. In our study we retrospectively assessed 30 consecutive patients with both storage and voiding LUTS but with otherwise normal clinical findings, mean age ± standard deviation 46±7 [median 44 years]. The exclusion criteria were urinary tract infections, diabetes mellitus, bladder outflow obstruction, proved by pressure flow study (PFS) neuropathies, urinary stones or neoplasm, or any other condition or (any drug treatment) possibly affecting bladder functions as high anxiety level, voiding habits, anticholinergic drugs or urine production rate.

All men had history taking, serum PSA, physical examination, DRE, abdominopelvic ultrasound (U/S), and urodynamics. We analyzed LUTS in all patients which include: Hesitancy, weak stream,
sense of incomplete emptying, intermittency, daytime frequency, nocturia and urgency.

Symptom severity and quality of life (QOL) were quantified by the International Prostate Symptoms Score (IPSS) and Quality Of Life Score (QOL) assessment questionnaire [3]. Prostate size was estimated by DRE and U/S.

Complete urodynamic tests including Qmax and pressure-flow study (PFS) were performed 3 months or more after the onset of symptoms.

Urodynamics were recorded using a multichannel computerized urodynamic system (Andromeda med. System GmbH). Free uroflowmetry were discarded if we suspect artifacts or if the voided volume less than 150ml, cystometry and pressure-flow study (PFS) were performed using a dual lumen 6F transurethral catheter (Purges, France) for infusing distilled water at room temperature at a rate of 15-50ml/min and vesical pressure recording. Abdominal pressure was measured by a 9F rectal catheter, detrusor pressure (Pdet) being derived electronically. We only considered PFS data analyzing for each man the tracing with the higher Qmax. The latter as well as Qave were assessed by Schafer’s nomograms [4]. As for voiding time, assumed to be linearly related to voided volume. The lower limits of normal were taken to range from 10 to 23 seconds for voided volume less than 150ml, cystometry and pressure-flow study (PFS) were performed 3 months or more after the onset of symptoms.

In cases falling within the "equivocal" class 2, BOO was defined by a minimum voiding pressure (the lowest detrusor pressure at the lowest measurable flow, Pdet.min.void) greater than 40cm H₂O and/or a mean linearized passive urethral resistance relation (LPURR) slope (PdetQmax-Pdet.min. void/Qmax) greater than 2cm H₂O (s/mL) [8]. A continuous scale grading of urethral resistance was provided by the Abrams/Griffiths (AG) number (Pdet.Qmax-2Qmax) [9], which represents unobstructed, equivocal and clearly obstructed cases by values of less than 20, 20 to 40, and greater than 40cm H₂O. Throughout the entire micturation we noted both the volume-independent factor WF [10] (i.e. the detrusor external voiding pressure per unit of bladder wall surface area, derived from Hill’s low [11] and the detrusor shortening velocity (Vdet). In particular, the maximum shortening velocity (Vdet.max) was noted, and the 5th percentile of its distribution (9.0mm/s taken as the lower limit of normal). Plots of the detrusor shortening velocity (Vdet), as a function of bladder volume have been made. This enabled manual correction of artifacts, to which the calculation of the detrusor shortening velocity (Vdet), is very sensitive (especially for small bladder volumes, i.e., near the end of voiding, where Vdet.max is usually attained). Also, to obtain meaningful maximum contraction velocity values, the detrusor shortening velocity (Vdet), was also determined at a standardized minimum bladder volume of 20ml. (Vdet20). As indices of detrusor contractility (contraction strength) [12] we took the highest WF value recorded during voiding contraction (WFmax) and the "projected isometric pressure" (PIP) [7], this latter resulting on the x-axis of the LPURR diagram by the formula Pdet.Qmax + 5Qmax. Detrusor underactivity was defined by values of less than 12 [W/m²] for WFmax [13] and less than 100cm H₂O [6,7] for PIP, WF normally increases during voiding up to a peak near the end of micturation [10], then negative or positive values of WF80-WF20 (the level of WF at 80% of full bladder volume minus its level at 20%), could discriminate between patients whose voiding contractions were well sustained or faded away prematurely [14]. The fraction of maximum cystometric capacity (MCC) that could be voided (VV/MCCx100) [15] defined bladder voiding efficiency.

**Results**

Definitions and units conformed to the International Continence Society standards [8,16,17]. Weak urine stream, nocturia, hesitancy, intermittency, sense of incomplete emptying, daytime frequency, and urgency of voiding were the LUTS shown by 30,27,30,28,29,14 and 2 patients respectively. IPSS and QOL score were 24±4 (25) and 5.2±0.6 (5). Analysis of cystometry data showed that bladder sensation and compliance were in the normal range in all patients; and that detrusor overactivity was present in 2 patients whose symptoms also comprised urgency of voiding.

Pressure flow-study analysis showed that the maximum shortening velocity (Vdet.max), the detrusor shortening velocity at a standardized minimum bladder volume of 20ml. (Vdet20), Qmax, and Qave were low; and voiding time was longer, and WF80-WF20 was increased, and MCC, VV, LPURR slope, and AG number were normal (Figs. 1-4).

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Fig. (1): A Uroflow of 43 years old patient with peak flow rate 11ml/s, total voided volume 284ml and post voiding residual urine (70ml).

Fig. (2): Voiding cystometry for the same patient shows low detrusor pressure (P det at Q max = 29.2cm H₂O), low Q max (6.6ml/s) and Wmax 4.6.

Fig. (3): A Uroflow of 39 years old patient with peak flow rate 12ml/s, total voided volume 209ml and post voiding residual urine (50ml).

Fig. (4): Voiding cystometry for the same patient shows low detrusor pressure (P det at Q max = 24.8cm H₂O), low Q max (9.7ml/s) and Wmax 8.1.

Discussion

At time of presentation of our patients, both storage and voiding symptoms (LUTS) and their quality of life was impaired, as indicated by the IPSS and QOL score. Yet they had otherwise normal clinical findings. No patient had BOO, and serum PSA level, prostate volume and detrusor contraction strength values (WFmax, PIP) were lower than normal ranges which did not depend on reduced bladder volumes (MCC, VV), or a decreased urethral resistance (AG number, LPURR slope). There is a low detrusor contraction velocity as shown by lower values of Vdet.max and Vdet20, a longer voiding time and reduced Qmax and Qave. So, a urodynamic diagnosis of DUA (a decrease in detrusor contraction strength) in which such patients showed reduced levels of the detrusor contraction strength parameters WFmax and PIP. This DUA could be regarded as idiopathic in those patients with no pathologic conditions affecting bladder mechanics (eg. Neuropathies, BPH).

Conclusions:

In men with storage and voiding LUTS and otherwise normal clinical findings, idiopathic detrusor underactivity must be considered and urodynamic tracing, in our opinion, must be indicated. 45% of cases of DUA are neurogenic, another 45% was secondary to long-lasting condition of bladder outlet obstruction (BOO) usually from BPH, the remaining 10% were men with otherwise normal clinical findings in whom idiopathic DUA could be diagnosed urodynamically by lowered detrusor contraction strength in our study.

References


