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Video-Urodynamic Characteristics in Women with Urgency due to Detrusor Sphincter Dyssynergia and Idiopathic External Urethral Sphincter Hyperactivity

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Material and Methods: Between July 2013 and May 2015, 82 women who underwent VUD studies due to urgency were analyzed. Women were evaluated carefully by complete history, physical investigation, urosonography, voiding diary, and video-urodynamic investigation.

Results: Using VUD, we found DSD or SH in 40 of 83(48%) women. Median age of women was 54 ± 18 (range: 22-84). DSD and SH were found in 31 of 40 (78%) and 9 of 40 (22%) women respectively. 19 of 40 (48%) women had urge incontinence with median pad usage of 4 ± 2 (range: 1-10) daily. 20 of 40 (50%) women suffered from recurrent urinary infections.

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Conclusion: Detrusor sphincter dyssynergia and idiopathic external urethral sphincter hyperactivity can lead to urgency as a primary complaint. Video-urodynamic plays a critical role in diagnosing the cause of urgency.

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I. Introduction

Detrusor external sphincter dyssynergia (DSD) is defined as detrusor contraction concurrent with an involuntary contraction of the urethral sphincter and/or periurethral striated muscle due to neurologic abnormality [1]. In the absence of neurological abnormality, impaired coordination of bladder contraction and sphincter relaxation is more appropriately referred to as dysfunctional voiding or idiopathic external urethral sphincter hyperactivity (SH) [2, 3]. Unfortunately, there is no gold standard for the diagnosis of DSD or SH. The combination of pelvic floor electromyography (EMG) and videocystourethrography (VCUG) during video-urodynamic study (VUD) are the most acceptable and widely agreed upon methods for the diagnosis of DSD [4, 5]

Urgency is the key symptom of overactive bladder (OAB). Urgency is defined as a sudden compelling desire to void which is difficult to defer [1]. The simultaneous contractions of the external urethral sphincter and the detrusor lead to high voiding pressure, large post-void residual urine, and urgency.

Our study evaluated the urodynamic findings of females who suffer from urgency due to detrusor sphincter dyssynergia or idiopathic external urethral sphincter hyperactivity. Women with DSD or idiopathic SH report of OAB symptoms such as urgency as the primary complaint. The diagnosis of DSD or idiopathic SH using VUD can be very critical for the choice of the treatment for urgency in females.

II. Materials and Methods

a) Patients

Between July 2013 and May 2015, 82 women suffering urgency underwent VUD investigation at the Department of Urology of University Medical Center Goettingen. We analyzed the data of women and the urodynamic findings retrospectively. All methods, definitions, and units are according to the standards recommended by the International Continence Society [1].

b) Ethics statement

The study was approved by the local Ethics Committee of the University Medical Center Goettingen (permit 5/4/15).

c) Measurements

VUD studies were performed according to Good Urodynamic Practices recommended by the International Continence Society [1]. The diagnosis of DSD or SH was made using the standards recommended by the European Association of Urology (EAU) Guidelines [1]. We defined DSD as an increase in pelvic floor EMG activity during detrusor contraction in

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the absence of Valsalva's or Crede's maneuver and/or dilated posterior urethra obstructed by the external sphincter in VCUR [4, 5].Minimal acceptable criterion for agreement between the EMG and VCUG was set at 70%. During VUD investigation, pelvic floor EMG and VCUG were performed simultaneously. All VUD investigations were performed in a sitting position. Filling cystometry was initiated with a body temperature Ringer's lactate solution at a speed of 20 mL/min. The intravesical and urethral pressure were measured simultaneously using a dual lumen 8 French transurethral urodynamic catheter placed in the bladder and the external urethral sphincter[5].Two patch EMG electrodes were placed around the anus and a third ground patch electrode was placed over the adductor tendon on the medial aspect of the patient's left knee [1]. During the urodynamic study, the pressure was continuously monitored and the correct position of the catheter was ensured. The same urodynamic system (Medical Measurement Systems GmbH, Enschede, Netherlande) was applied for all studies.

We included women with urgency symptoms [1]. We excluded patients with signs of automatic dysreflexia, known anatomic abnormalities of the urinary tract such as urethra stricture and vesico-ureteral reflux, women who received immunosuppressive treatment, pregnant women and those with nonbacterial urinary tract infection, from the study.

Evaluated data was prospectively collated and included: women demographics (age) and lower urinary tract symptoms (LUTS) such as voiding frequency, nocturia episodes, and irrepressible urgency. All women were evaluated via complete history, voiding diary, physical investigation, sonography and VUD study.

All VUD studies were assessed by an experienced urogynecologist using a standardized practice in accordance to the recommendations of the International Continence Society (ICS) [abrams]. We performed VUD to measure cystometric variables and to detect voiding disorders. Following variables were measured during the VUD: cystometric bladder capacity (CBC), maximum flow rate (Q_{max}), post-void residual (PVR) volume, detrusor pressure at Q_{max} (P_{det}), and external urethral sphincter electromyography. Definitions of urodynamic disorders were also made using the recommendations of ICS [1].

d) Statistical analyses

Data was analyzed using the Statistical Package for the Social Sciences (SPSS, Inc., Chicago, IL) program. We used a T-test for continuous data and Chi square test for dichotomous data. The significance level was set at a P value of less than 0.05.

III. Results

Using VUD, we found DSD or idiopathic pelvic floor hyperactivity in 40 of 82 (48%) women. The median age of women was 54 ± 18 (range: 22-84). DSD and idiopathic SH were found in 31 of 40 (78%) and 9 of 40 (22%) women respectively. 19 of 40 (48%) women had urge incontinence with median pad usage of 4 ± 2 (range: 1-10) daily. 20 of 40 (50%) women suffered from recurrent urinary infections. 15 of 40 (38%) women had neurogenic voiding dysfunctions due to multiple sclerosis. Detrusor underactivity andoveractivity were found in 12 of 40 (30%) and 12 of 40 (30%) respectively. 16 of 40 (60%) women had a normal detrusor activity urodynamically. 4 of 40 (10%) women performed intermittent self catheterization due to urinary retention. Table 1 describes the urodynamic findings of women.

Table 1 : Lower urinary tract symptoms (LUTS) and cystometric findings

	Study group (n =40)
Lower urinary tract symptoms (LUTS)	
Voiding frequency (median± SD, range)	8 ± 5 (3-24)
Nocturia> 2 n(%)	28 (70%)
Nocturia (median ± SD, range)	2 ± 2 (1-4)
Cystometric findings	
Q_{max} (ml/sec) (median ± SD, range)	12 ± 6 (2-26)
$Q_{max}(P_{det})$ (cmH_2O) (median ± SD, range)	37± 22 (10-124)
CBC (ml) (median ± SD, range)	340 ± 165 (70-690)

CBCcystometric bladder capacity; Q_{max}maximum flow rate; $Q_{max}(P_{det})$ detrusor pressure at Q_{max}

IV. Discussion

DSD is as detrusor contraction concurrent with an involuntary contraction of the urethral sphincter and/ or periurethral striated muscle due to neurologic abnormality [1]. Idiopathic SHis the presence of external urinary sphincter contraction occurring during micturition without neurogenic abnormality [6]. Causes of idiopathic SH may be abdominal straining or attempted inhibition of detrusor contraction [7]. The EMG activity is elevated during detrusor contraction in patients with DSD or SH [4, 6]. In our study, the diagnosis of DSD with EMG was standardized using patch electrodes and the same electrode placement. We found that women with DSD or SH suffer from overactive bladder symptoms on the basis of urgency with or without urinary incontinence.

VUD plays an important role in the diagnosis of women with urgency in terms of the presence of DSD or voiding dysfunction. Urgency is believed to be indicative of the subsequent finding of OAB syndrome or detrusor overactivity [8]. In the literature, discordance between OAB and DO has also been reported [9]. Digesu et al. found that only half of patients with OAB had DO on VUD, and only 27% of patients with urodynamic diagnosed DO had urgency [9]. In our study, only 30% (12 of 40) of women with DSD and urgency additionally had detrusor overactivity on VUD. Nevertheless, urgency was found to be suggestive of a high probability among patients with DSD. Although, DSD affects the choice and response to treatment of urgency patients. Antimuscarinic therapy in patients with urgency due to DSD or idiopathic SH may lead to dysfunctional voiding with residual urine retention and secondary increasing of urgency.

In most cases, DSD and SH can lead to bladder outlet obstruction (BOO). In women, there are no standardized urodynamic criteria for the diagnosis of BOO. Chassagne et al. reported that using a combined cut-off value of Qmax<15 ml/s and PdetQmax>20cm H_2O for diagnosis of BOO in females had a sensitivity of 74% and a specificity of 91%[10]. Using these criteria, the prevalence of BOO in women with DSD or SH was 58% (23 of 40) in our study. Because of the lack of standard definitions of BOO, this prevalence varies between 3% and 29% [11].Cho et al. reported a BOO prevalence of 43% (70 of 163) in women with OAB symptoms. Females with BOO complain about obstructive and storage symptoms of the lower urinary tract [8]. Kayigil et al. reported that BOO was more frequent in individuals with idiopathic DO than in the control group using a different cut-off value for BOO [12].They described that some women with BOO reported storage symptoms as the initial complaint.

In our study, 30% (12 of 40) of women with urgency and DSD or SH had detrusor underactivity (DUA). DUA is a contraction of reduced strength and/or duration, which results in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span[1].DUA is, in the most cases, idiopathic and can also be encouraged by neurogenic diseases, pelvis surgery, and drug therapy. The incidence of idiopathic DUA in adult women is about 30% [13]. DUA leads to voiding dysfunction with low Qmax and a high urine residual volume. However, some females with DUA complain primarily of storage symptoms and urgency. In this particular case, the diagnosis of DUA can only be made with VUD. DUA may have caused frequent urination and urgency observed in this study. In the present study, the prevalence of DUA, depending on the diagnostic criteria, is relatively high.

V. Conclusions

Detrusor sphincter dyssynergia and idiopathic external urethral sphincter hyperactivity can lead to urgency as the primary complaint. Video-urodynamic plays a critical role in diagnosing the cause of urgency such as detrusor sphincter dyssynergia or idiopathic external urethral sphincter hyperactivity.

Conflict of Interest: The authors declare that they have no conflict of interest.

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