Arab Journal of Urology

ISSN: (Print) 2090-598X (Online) Journal homepage: https://www.tandfonline.com/loi/taju20

Detrusor after contractions in men with lower urinary tract symptoms: Myth or reality?

Bassem S. Wadie & Mohamed M. Elsaadany

To cite this article: Bassem S. Wadie & Mohamed M. Elsaadany (2013) Detrusor after contractions in men with lower urinary tract symptoms: Myth or reality?, Arab Journal of Urology, 11:4, 336-339, DOI: 10.1016/j.aju.2013.07.004

To link to this article: https://doi.org/10.1016/j.aju.2013.07.004

Arab Journal of Urology (2013) **11**, 336–339

Arab Journal of Urology
(Official Journal of the Arab Association of Urology)

www.sciencedirect.com

VOIDING DYSFUNCTION / FEMALE UROLOGY
ORIGINAL ARTICLE

Detrusor after contractions in men with lower urinary tract symptoms: Myth or reality?

Bassem S. Wadie *, **Mohamed M. Elsaadany**

Voiding Dysfunction and Female Urology Unit, Urology and Nephrology Center, Mansoura University, Mansoura 35517, Egypt

Received 21 April 2013, Received in revised form 13 July 2013, Accepted 14 July 2013
Available online 17 August 2013

KEYWORDS

After contraction;
LUTS;
BOO;
Urodynamics

ABBREVIATIONS

AC, After contraction;
DO, detrusor overactivity;
EMG, electromyography;
MCC, maximum cystometric capacity;
$Pdet_{max}$, maximum detrusor pressure;
$PdetQ_{max}$, detrusor pressure at Q_{max};

Abstract ***Objectives:*** To study after contractions in men with lower urinary tract symptoms (LUTS) related to bladder outlet obstruction (BOO), in the absence of neuropathy, and to verify whether it is associated with the severity of symptoms or certain filling and voiding variables.

Patients and methods: Of 380 patients with LUTS and who were assessed using urodynamic studies, we retrospectively analysed those who had after contractions (ACs). Bladder overactivity was diagnosed as any increase in the detrusor pressure of <2-s duration during the filling phase, and an AC was diagnosed as any increase in the detrusor pressure of $\geqslant 2$ s after the end of the voiding phase and complete cessation of flow. The presence of ACs was then assessed in relation to different components of the International Prostate Symptom Score (IPSS), using a two-tailed Levene's test, and to filling and voiding cystometry variables, using Mann–Whitney-Wilcoxon Rank test.

Results: In all, 373 of the 380 patients were included (seven had invalid voiding cystometry); ACs were detected in 51 (13.9%). There was no statistical significance for associations between AC and any of the variables assessed, including individual questions of the IPSS, detrusor overactivity, cystometric capacity, compliance, maximum urinary flow rate (Q_{max}), detrusor pressure at Q_{max} or the maximum detrusor voiding pressure.

* Corresponding author. Tel.: +20 50 2262222; fax: +20 50 2263717.
E-mail address: Bassem_wadie@mans.edu.eg (B.S. Wadie).
Peer review under responsibility of Arab Association of Urology.

Production and hosting by Elsevier

http://dx.doi.org/10.1016/j.aju.2013.07.004

PVR, postvoid residual urine volume; Q_{max}, maximum urinary flow rate

Conclusion: ACs detected on voiding cystometry of men with LUTS attributed to BOO do not seem to be related to symptoms, or filling and voiding variables.

Introduction

Detrusor after-contractions (ACs) are an ill-defined urodynamic finding. The pathogenesis ranges from an artefact resulting from an over-coapted microtip catheter to premature closure of the external sphincter [1]. They are also reported to be related to bladder overactivity [2]. The clinical and symptomatic significance has also been vague. In this retrospective analysis, we assessed the incidence, pattern and association of detrusor ACs in men with symptomatic BOO and determined whether ACs were associated with any symptomatic or urodynamic abnormality.

Patients and methods

Between 2005 and 2007, patients fulfilling the inclusion criteria of being male, aged >45 years, with an IPSS of >8, a Schafer grade of BOO of $\geqslant 3$, and a free maximum urinary flow rate (Q_{max}) of <15 mL/s, were enrolled in the study. Based on the concept introduced by Schäfer et al. [3], the grading of the pressure-flow relation, using the linear passive resistance relation, was ranked into seven grades where grades 0 and 1 were 'unobstructed', 2 was 'equivocally obstructed' and 3–6 was 'obstructed'.

An unvalidated Arabic version of the IPSS used in this study was the subject of previous reports [4,5]. Men with an indwelling urethral catheter, previous surgical treatment for BPH, any associated bladder pathology, urethral strictures or neuropathic bladder were excluded.

In all, 380 patients qualified for the study, while 51 had ACs. All had a thorough clinical evaluation, including a DRE and neuro-urological examinations, urine analysis, and an estimate of serum total PSA level and free urinary flow rate. Filling cystometry was done using an 8-F dual-lumen catheter. Initially the postvoid residual urine volume (PVR) was measured. The bladder was then filled at 50 mL/min with sterile water at room temperature. Voiding cystometry was assessed with the patient standing, with a simultaneous flow measurement. The technique, definitions and units of urodynamic measurements conformed to the standards of the ICS [6].

For this study AC was defined as any increase in detrusor pressure after the end of the voiding phase and complete cessation of urethral flow, that continued for $\geqslant 2$ s, in the absence of abdominal contraction. The threshold of 2 s was used based on the recommendation of the ICS on uroflowmetry in the first 'Good Urodynamic Practice' guidelines [7]. Fig. 1 shows an example of an AC.

The mean scores of the different items of the IPSS, i.e., the storage subtotal score (sum of questions 2, 4 and 7), voiding subtotal score (sum of questions 1, 3, 5, and 6) and total score of men with ACs were compared to those with no ACs. The same comparison was made for the variables of filling and voiding cystometry, i.e., the PVR, maximum cystometric capacity (MCC), compliance, detrusor overactivity (DO), detrusor pressure at Q_{max} ($PdetQ_{max}$), the maximum Pdet ($Pdet_{max}$), Q_{max} and voiding time (calculated from the start of voiding to the end of the same voiding cycle).

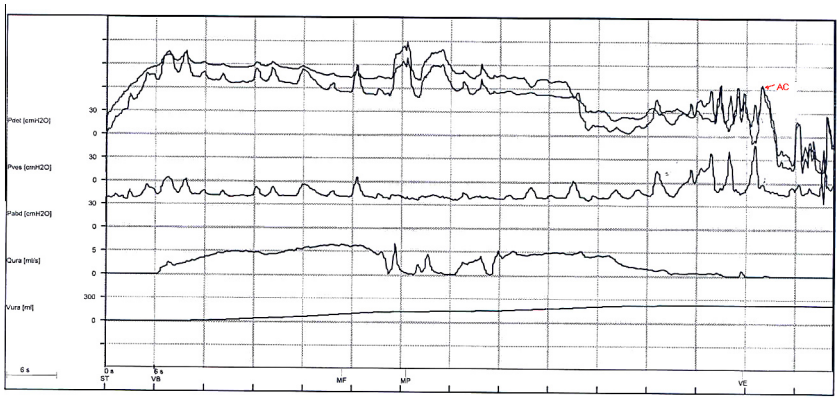

Figure 1 A water cystometry trace, showing an AC after the end of voiding. Note that the vesical and detrusor traces overlap in the later section.

Any correlation between the presence or absence of ACs and the urodynamic variables was also assessed.

The association of ACs with the IPSS was assessed using a two-tailed independent sample *t*-test (Levene's test). The relationship to different urodynamic variables was assessed using the Mann–Whitney-Wilcoxon Rank test, except for detrusor overactivity, where the chi-square test was used. Spearman's correlation coefficient was calculated between the presence of AC and different urodynamic variables.

Results

In all, 373 of the 380 patients were included in analysis; the remaining seven had an invalid voiding cystometry (the catheter slipped before the end of voiding, or the contraction observed did not match the criteria adopted). The mean (SD) age of these patients was 60.7 (8) years. In all, 51 (13.7%) patients had positive ACs based on the definition adopted.

There was no statistically significant association between ACs and any of the variables assessed. Table 1 shows the comparison between ACs and the symptom scores of the IPSS, and between ACs and the urodynamic variables. The presence of ACs had a poor to very poor correlation with the filling and voiding cystometry variables. Table 2 shows Spearman's correlation coefficients between AC and the urodynamic variables. Fig. 1 shows an AC of 60 cmH_2O amplitude noted after the end of the voiding phase during cystometry in a 63-year-old patient.

Table 2 Spearman's correlation coefficients between the presence of ACs and different urodynamic variables.

Variable	Correlation with AC
MCC	−0.06
Compliance	0.08
$Pdet_{max}$	0.10
$PdetQ_{max}$	0.10
Q_{max}	−0.06
Voiding time	0.06

Discussion

The occurrence of a detrusor contraction after the end of micturition was long thought to be an ill-defined phenomenon. Whether it is a cause of symptoms or an effect of detrusor dysfunction remained unclear. Since the ICS report of 2002 on the standardization of terminology, the ICS has not given a definition of ACs and it was not considered at all in that report [4].

ACs have been linked to different symptoms, including urgency, urge incontinence and frequency in children [2,8]. In the present study an AC was not related to any particular symptom among the LUTS assessed by the IPSS. Even with totalling the scores into storage symptoms, voiding symptoms and a total score, no significant relation was detected. This suggests that the presence of ACs was not associated with any increase in the severity of LUTS.

Some authors [8] considered ACs to be an artefact occurring in the voiding cystometry trace. Hoebeke

Table 1 The symptom scores and urodynamic variables among patients with and with no ACs.

Variable	With ACs	No ACs	P^*
No. of patients	51	322	
Mean (SD) score, IPSS questions			
1 Feeling of incomplete emptying	2.34 (20)	2.30 (1.90)	0.78
2 Frequency	1.81 (1.80)	2.04 (1.90)	0.73
3 Intermittent stream	2.86 (1.85)	2.66 (1.88)	0.51
4 Urgency	2.12 (2.18)	1.92 (1.98)	0.57
5 Weak stream	3.10 (1.76)	3.38 (3.36)	0.57
6 Straining	1.71 (1.80)	1.85 (1.93)	0.70
7 Nocturia	3.12 (1.60)	3.02 (1.47)	0.66
8 Storage subtotal score	10.14 (5.50)	10.12 (5.0)	0.92
9 Voiding subtotal score	7.20 (4.70)	7.10 (4.0)	0.82
10 Total score	17.1 (8.0)	17 (7.0)	0.81
Urodynamic variables			
PVR (mL)	40.7 (68)	41.5 (74)	0.95†
MCC (mL)	314.3 (119)	334 (132)	0.31†
Compliance (ml/cmH_2O)	18.5 (20)	21.7 (30)	0.81†
DO, *n* (%)	13 (25)	93 (28.8)	0.62‡
$PdetQ_{max}$ (cmH_2O)	68.1 (29)	61.4 (33)	0.18†
$Pdet_{max}$ (cmH_2O)	92.4 (40)	84.5 (47)	0.27†
Q_{max} (mL/s)	6.7 (3.5)	6.8 (3.7)	0.78†
Voiding time (s)	82.9 (76)	79.0 (62)	0.70†

* Mann–Whitney-U-Wilcoxon rank sum test.
† Independent sample *t*-test.
‡ Chi-square test.

et al. [2], in a prospective study, proved that an AC is a genuine detrusor contraction. They found ACs in 84 (33.6%) of 250 children with non-neuropathic voiding dysfunction. The authors concluded that an AC is a true urodynamic finding and is an indicator of DO. By contrast, Ruarte et al. [9] found that the incidence of DO among children having ACs was 81%, but was 70% among children who had no ACs. They suggested that probably ACs were not directly related to DO and these two urodynamic findings might coincide because both are common. In men, ACs coincided with increased electromyographic (EMG) activity of the perineal muscles at the end of micturition, and were interpreted by some as premature closure of the bladder neck [10].

In the present series we could not detect any association or correlation between ACs and filling cystometry variables, including DO. The occurrence of ACs was not affected by bladder capacity, compliance, the presence or absence of DO, or Q_{max}, $Pdet_{max}$ and $PdetQ_{max}$.

Vereecken [11] postulated that ACs originated from a contraction of the external sphincter during voiding. They studied 65 children, using invasive urodynamics with EMG and pressure monitoring of the external sphincter, and detected contractions of the external sphincter just before the onset of an AC, and accordingly attributed the AC to external sphincter contraction. We did not use routine video-urodynamic and EMG studies in the present patients, so we cannot verify this finding.

According to Webster et al. [12], the prevalence of ACs was 2% in 1000 patients sampled (mean age 35 years, range 9–61). They concluded that ACs are of no functional significance or diagnostic value, although they found them more often in patients with urgency incontinence. The present results are in line with these results. However, the incidence of ACs among the present patients was much higher (13.7%). Notably, the present patients were much older (mean age 60.7 years) and represent a selected group with predominant symptoms of BPH.

Cho et al. [13] concluded that the presence of ACs was significantly correlated with the presence of BOO in both genders, in a study involving 2309 patient of both genders and with a diversity of diagnoses. We failed to detect any association between BOO and the presence or absence of AC in men with BOO.

The number of AC-positive patients in the present group was limited (51) and this would possibly weaken the statistical analysis. The addition of EMG would have helped by studying the pelvic floor during voiding, and probably the use of an overall-health questionnaire might have widened the spectrum of the results.

In conclusion, ACs were not related to any particular symptom among LUTS, as rated by the IPSS. They were also unrelated to filling and voiding cystometry variables. In men with BOO, ACs represent a urodynamic finding that is not yet understood.

Conflict of interest

None.

Source of funding

None.

References

[1] Pesce F, Rubilotta E. Detrusor after-contraction: is this important? *Curr Urol Rep* 2004;**5**:353–8.
[2] Hoebeke PB, Van Gool JD, Van Laecke E, Van de Walle J, Plancke H. The after-contraction in paediatric urodynamics. *Br J Urol* 1996;**78**:780–2.
[3] Schäfer W, Waterbär F, Langen PH, Deutz FJ. A simplified graphical procedure for detailed analysis of detrusor and outlet function during voiding. *Neurourol Urodynam* 1989;**8**:405–9.
[4] Wadie BS, Ibrahim E-HI, de la Rosette JJ, Gomha MA, Ghoneim MA. The relationship of the International Prostate Symptom Score and objective parameters for diagnosing bladder outlet obstruction. Part I. When statistics fail. *J Urol* 2001;**165**:32–4.
[5] Wadie BS, Ebrahim EE, Gomha MA. The relationship of detrusor instability and symptoms with objective parameters used for diagnosing bladder outlet obstruction: a prospective study. *J Urol* 2002;**168**:132–4.
[6] Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, et al. The standardization of terminology of lower urinary tract function: report from the Standardisation Subcommittee of the International Continence Society. *Neurourol Urodyn* 2002;**21**:167–78.
[7] Schafer W, Abrams P, Liao L, Mattiasson A, Pesce F, Spangberg A, et al. Good Urodynamic Practices. Uroflowmetry, filling cystometry, and pressure-flow studies. *Neurourol Urodyn* 2002;**21**:261–74.
[8] Mutchnik SE, Sukin S, Boone TB. Case studies in voiding dysfunction. *Contemp Urol Arch* 1999;**12**:110–3.
[9] Ruarte AC, Podesta ML, Medel R. Detrusor after-contraction in children with normal urinary tracts. *BJU Int* 2002;**90**:286–93.
[10] Scott FB, Quesada EM, Cardus D. Studies on the dynamics of micturition. Observations on healthy men. *J Urol* 1964;**92**:455–63.
[11] Verecken RL. The after-contraction: a true detrusor contraction or a late dyssynergic urethral sphincter contraction? *BJU Int* 2000;**85**:246–8.
[12] Webster GD, Koefoot RB, Zakrewski CJ, Todd S. The after-contraction in urodynamic micturition studies. *Neurourol Urodyn* 1983;**2**:213–8.
[13] Cho SY, Yi JS, Park JH, Jeong MS, Oh SJ. Detrusor after-contraction is associated with bladder outlet obstruction. *Neurourol Urodyn* 2011;**30**:1361–5.