



Bladder Wall Thickness in Overactive Bladder: Does It Have a Role?

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Abstract

Context: Overactive bladder syndrome (OAB) is a highly prevalent condition. Urodynamics have long been the only option, and still remain the gold standard, for examining people with OAB complaints and composing an appropriate treatment plan. Alternatives for this invasive, expensive, and time-consuming examination have been explored.

Objective: To review if bladder wall thickness (BWT) could be a more objective and easier measurement that potentially could diagnose OAB and be used to analyse treatment response.

Evidence acquisition: Proposed and opposed arguments on the role of BWT in OAB were discussed during the seminar, “The Great Bladder Wall Thickness Debate: Tearing It Down Brick by Brick,” at the 2nd World Congress on Controversies in Urology (CURy) in Lisbon, Portugal. Those arguments are summarised in this paper.

Evidence synthesis: The assessment of BWT (ie, the thickness of the mucosa layer, detrusor muscle, and adventitia) is an indirect measure of detrusor muscle thickness. There is no standard method of measuring BWT. In a Web-based survey conducted before the congress, 49% of the physicians who participated agreed that BWT has a role in OAB; at the end of the debate, the survey question was repeated to the participants of the session and only 20% agreed that BWT has a role in OAB in clinical practice today.

Conclusions: At the moment, there is no standardised method of measuring BWT. Assessing BWT with ultrasonography is a very appealing concept for research purposes, but more studies are needed before it will become a tool in daily clinical practice.

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1. Introduction

Overactive bladder syndrome (OAB) is a highly prevalent condition. The population-based EPIC survey indicated that OAB symptoms were present in 12.8% of women and 10.8% of men >18 yr old [1]. In this large survey, conducted

throughout four European countries and Canada in 2005, the 2002 International Continence Society (ICS) definition of OAB was used: “urgency, with or without urge incontinence, usually with frequency and nocturia” [2]. The EPIC study confirmed the findings of the earlier National Overactive Bladder Evaluation (NOBLE) survey, initiated

to estimate the prevalence of OAB in the American adult population. The NOBLE study had shown that the prevalence in men (16%) and in women (16.9%) was very similar [3].

Urodynamics have long been the only option, and still remain the gold standard, for examining people with OAB complaints and composing an appropriate treatment plan [4]. Alternatives for this invasive, expensive, and time-consuming examination have been explored. Bladder wall thickness (BWT) has been suggested as a more objective and easier measurement that potentially could diagnose OAB and be used to analyse treatment response.

2. Evidence acquisition

Proposed and opposed arguments on the role of BWT in OAB were discussed during the seminar, “The Great Bladder Wall Thickness Debate: Tearing It Down Brick by Brick,” at the 2nd World Congress on Controversies in Urology (CURy) in Lisbon, Portugal. Those arguments are summarised in this paper.

3. Evidence synthesis

3.1. Why bladder wall thickness?

Often OAB symptoms like urgency are associated with detrusor overactivity (DO), defined as the urodynamic observation characterised by involuntary detrusor contractions during the filling phase that may be spontaneous or provoked [5]. Detrusor muscle hypertrophy could be the result of repeated detrusor contractions against a closed urethral sphincter [6,7]. The assessment of BWT (ie, the thickness of the mucosa layer, detrusor muscle, and adventitia) is an indirect measure of detrusor muscle thickness.

3.2. Is measurement of bladder wall thickness reliable?

Many arguments suggest that BWT is too difficult to measure, including the fact that measurements differ to a large extent from one measurer to another. A quick review of the literature reveals very diverse numbers used as a cut-off to suggest DO [8,9]. When looking at the data in more detail, it becomes clear that there is no standard method of measuring

BWT. Each centre has its own protocol with advantages and disadvantages, making it difficult to compare studies.

3.2.1. What is “normal” bladder wall thickness?

A German group tried to establish normal values for BWT in males and females (aged 5–76 yr; mean age: 38 yr) [10]. Using suprapubic ultrasonography (US), they assessed BWT in 172 males and 166 females with normal lower urinary tracts. At bladder volumes between 100 ml and 200 ml, mean BWT was 3.3 mm in men and 3.0 mm in women. BWT increased with age, although this correlation was weak.

In 2006, Oelke et al reported detrusor wall thickness (DWT) measured by suprapubic US in 55 healthy adults [11]. They demonstrated that DWT decreased rapidly during the first 250 ml of bladder filling but thereafter reached a plateau phase. Therefore, this group opted to measure at full bladder. In this study, detrusor wall was thicker in men than in women (1.4 mm vs 1.2 mm, respectively; $p < 0.001$).

3.2.2. Bladder wall/detrusor thickness in male patients

Data from the peer-reviewed literature suggest a lack of standardisation of BWT measurement (Table 1). Two studies from Europe, in line with the original data from Kojima and coworkers [12], show a significant difference in BWT between obstructed and nonobstructed patients [9,13]. No difference was observed in the study performed in Australia by Blatt and coworkers [4].

3.2.3. Bladder wall thickness in female patients

Data from the peer-reviewed literature show a significant difference in BWT between normal subjects and females with non-neurogenic DO (Table 2). Whether these statistically significant differences result in an assessment for diagnosis of OAB is discussed below.

3.3. Does bladder wall thickness have a role in diagnosis of overactive bladder?

In a Web-based survey conducted before the congress, 49% of the physicians who participated agreed that BWT has a role in OAB.

The group at King's College Hospital in London uses transvaginal US to measure BWT in women with urinary symptoms [14]. In the 1990s, they developed a protocol that

Table 1 – Bladder wall/detrusor thickness in male patients

Reference	Parameter	Nonobstructed	Equivocal	Obstructed	<i>p</i>
Manieri et al [9]	Bladder wall	3.4	3.9	5.3	<0.001
Oelke et al [13]	Detrusor	1.33	1.62	2.4	<0.001
Blatt et al [4]	Bladder wall	2.0	–	2.1	0.31

Table 2 – Bladder wall/detrusor thickness in female patients

Reference	Parameter	Normal	Stress incontinence	Detrusor overactivity	<i>p</i>
Khullar et al [14]	Bladder wall	–	3.5	6.7	<0.001
Robinson et al [7]	Bladder wall	5.1	4.8	6.7	<0.001
Lekskulchai and Dietz [6]	Detrusor	4.1	–	4.7	<0.001

has good intra- and interobserver reproducibility. Measurements are performed at empty bladder.

In a blinded, prospective study, BWT measurements were compared with ambulatory urodynamics when investigating women with storage symptoms [7]. Women with a normal ambulatory study had a mean BWT of 5.1 mm, while those with detrusor instability had a mean BWT of 6.7 mm ($p < 0.05$; Table 2). The authors concluded that transvaginal US is a useful additional tool for assessing detrusor instability.

A recent Australian prospective study assessed BWT by transabdominal US at 200-ml bladder filling in 73 men and 107 women (mean age: 62 yr) with non-neurogenic voiding dysfunction [4]. Four urodynamically defined groups (with different gender proportions) were compared. No significant difference was found among the groups. The bladder wall was slightly thicker in males than in females (mean: 2.1 mm vs 1.9 mm; $p = 0.064$). The authors concluded that BWT measurement cannot reliably predict DO, so it does not provide an alternative to urodynamic studies for diagnosing voiding dysfunction.

In a recent retrospective study in 686 women, the diagnostic value of DWT in predicting DO was examined using receiver-operating characteristic (ROC) analysis [6]. DWT measurements were taken by translabial US after bladder emptying. Mean DWT was significantly greater in women with DO than in women without DO (Table 2). However, with an area under the curve (AUC) of only 0.606, measurements of DWT should not be used as a diagnostic parameter for DO in women, according to this study.

At the end of the debate, the survey question was repeated to the participants of the session; only 20% agreed that BWT has a role in OAB in clinical practice today.

4. Conclusions

At the moment, there is no standardised method of measuring BWT. Assessing BWT by US is a very appealing concept for research purposes, but more studies are needed before it will become a tool in daily clinical practice.

Conflicts of interest

Francisco Cruz is Consultant for Astellas, Allergan, and MountCook Pharma. Andrea Tubaro is consultant for Allergan, Astellas, GSK, Orion, Novartis, Pfizer, Specialty European Pharma, and Takeda-Millennium. The other authors have nothing to disclose.

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