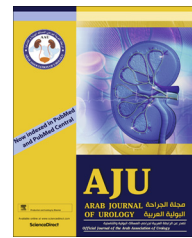




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VOIDING DYSFUNCTION/FEMALE UROLOGY MINI-REVIEW

The challenges in the diagnosis of detrusor underactivity in clinical practice: A mini-review



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KEYWORDS

Detrusor underactivity;
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Urodynamic;
Bladder outlet obstruction;
Chronic urinary retention

ABBREVIATIONS

BCI, bladder contractility index;
CUR, chronic urinary retention;
DHIC, detrusor hyperactivity with impaired contractility;
DO, detrusor overac-

Abstract Objective: To review the current definitions, terminology, epidemiology and aetiology of detrusor underactivity (DU), with specific attention to the diagnostic criteria in use. In addition, we address the relation and the overlap between DU and bladder outlet obstruction (BOO). In this mini-review, we hope to help identify DU patients and facilitate structured clinical evaluation and research.

Methods: We searched the English literature using ScienceDirect and PubMed for relevant articles. We used the following terms: 'detrusor underactivity', 'underactive bladder', 'post voiding residual', 'post micturition residual', 'acontractile bladder', 'detrusor failure', and 'detrusor areflexia'.

Result: DU is one of the most common conditions causing lower urinary tract symptoms (LUTS). Unfortunately, it is also the most poorly understood bladder dysfunction with scant research. To our knowledge there is no clear definition and no non-invasive method to characterise this important clinical condition. DU may result from the normal ageing process; however, it has multiple aetiologies including neurogenic and myogenic dysfunction. In many cases the symptoms of DU are similar to those of BOO and it usually requires invasive urodynamic study (UDS) for diagnosis to differentiate the two diagnoses. A number of diagnostic tests may be used including: UDS testing, the Schafer pressure/flow nomogram, linear passive urethral resistance relation, Watts factor, and the bladder contractility index. Of these, UDS testing is the most practical as it determines both the maximum urinary

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tivity;
 DU, detrusor underactivity;
 OAB, overactive bladder;
 $P_{det}@Q_{max}$, detrusor pressure at maximal flow;
 ICS, International Continence Society;
 LinPURR, linear passive urethral resistance relation;
 Q_{max} , maximum urinary flow rate;
 OAB, overactive bladder;
 PVR, post-void residual urine;
 UDS, urodynamic study

flow rate and the pressure exerted by the detrusor muscle relative to the maximal flow of urine, allowing for precise characterisation of detrusor function.

Conclusion: Currently, the diagnosis of DU is based on invasive urodynamic parameters as defined by the International Continence Society in 2002. There is no consensus for the definition of DU prior to 2002. As there is significant overlap between the symptoms of DU and BOO, it is difficult to diagnose DU clinically.

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Introduction

Detrusor underactivity (DU) is one of the most common conditions causing LUTS, yet it is poorly understood and therefore remains a topic of ongoing research [1,2]. Various terminologies have previously been used to describe DU, such as underactive bladder [3], impaired detrusor contractility [4], bladder failure, bladder decompensation, hypotonic bladder [5], detrusor areflexia, and detrusor failure [6]. The variety of terminology and various implied definitions reflect a lack of consensus. In 2002, the International Continence Society (ICS) defined DU as ‘a contraction of reduced strength and/or duration, resulting in prolonged bladder emptying and/or failure to achieve complete bladder emptying within a normal time span’ [2]. This definition is based mainly on urodynamic study (UDS) findings, not on symptoms. Whilst a definition based on the clinical syndrome of the condition may aid in the understanding of DU, the symptoms of DU are similar to those of BOO, such as weak or interrupted stream, and significant post-void residual urine (PVR) volume, which cannot be differentiated except by UDS.

Methods

We searched the literature for relevant articles from January 1972 to January 2016 using the electronic English databases ScienceDirect and PubMed. We used the terms: ‘detrusor underactivity’, ‘underactive bladder’, ‘post voiding residual’, ‘post micturition residual’, ‘acontractile bladder’, ‘detrusor failure’, and ‘detrusor areflexia’. Studies that were not in English, case reports,

or those not including any of the following: definition, terminology, epidemiology, aetiology of the DU, and the overlap between DU and BOO were excluded.

Results

The primary search identified 258 articles. After applying the above exclusion criteria, we included 33 articles. We found that the ICS definition does not include symptomatology. DU may be defined as ‘decrease in sensation of the micturition desire that may be accompanied by nocturia and frequency with decrease in voiding volume associated by incomplete bladder emptying and incontinence that may increase at night’ [7]. Including the symptom complex, as in definition of overactive bladder (OAB), may improve the diagnosis and treatment of DU. However, unfortunately, symptoms alone cannot be used for diagnosis in clinical practice due to the overlap between the symptoms of DU and BOO. The only practical method of differentiating these two conditions is UDS, an invasive technique. To our knowledge there is no clear definition or non-invasive method to resolve this important clinical condition [8]. Clinicians require multiple data for diagnosis such as the strength of detrusor contraction, whether detrusor contraction is sustained, and the presence or absence of incomplete bladder emptying. In contrast, clinicians may begin first-line management in the presence of OAB symptoms without confirming the diagnosis [1].

Epidemiology

Many of the clinical studies for patients with non-neurogenic LUTS showed that DU was present in 9–

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