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## Review

# The treatment of complex female urethral pathology

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Received 3 February 2017; received in revised form 19 May 2017; accepted 3 June 2017

## KEYWORDS

Urethral diverticula;  
Female urethral  
stricture;  
Lower urinary tract  
symptoms (LUTS);  
Reconstruction

**Abstract** Lower urinary tract symptoms (LUTS) in women produce significant bother. Common conditions causing LUTS in women include urinary tract infections, overactive bladder, and stress incontinence. Urethral diverticulae and female urethral strictures are rare pathologies. They can cause symptoms, which can mimic commoner conditions, leading to delay in diagnosis and unnecessary delay in treatment. In this article, we discuss in detail the definition, symptoms, epidemiology, pathogenesis, diagnosis, and treatment option for these two conditions. Further understanding of these conditions will aid in the proper diagnosis and prevent delay in management.

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## 1. Introduction

Lower urinary tract symptoms (LUTS) including weak stream, dysuria, frequency, urgency, feeling of incomplete evacuation, and incontinence, are a common source of bother in women. Historically female urethral pathologies were often overlooked as a cause of LUTS in women. In a study of 1000 female patients presenting with frequency, lesions of the urethra were present in 690 patients [1]. In

another study of 650 female patients complaining of various LUTS, the urethra was the cause of symptoms in 123 patients (18%), and it was a factor contributing to LUTS in 501 patients (72%) [2]. Urethral conditions may have been under-diagnosed particularly before local anesthetic endoscopy and magnetic resonance imaging (MRI) scans were easily available. A high level of suspicion is needed in the clinical evaluation of LUTS to reach a proper diagnosis. Mistaken diagnosis may lead to unnecessary procedures or neglect of treatment with consequent development of unexplained or atypical complications. Therefore it is important to consider urethral pathologies as a possible cause in any case of LUTS in women. The most common pathologies of the female urethra requiring surgical treatment are

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Peer review under responsibility of Second Military Medical University.

<https://doi.org/10.1016/j.ajur.2018.03.003>2214-3882/© 2018 Editorial Office of Asian Journal of Urology. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Please cite this article in press as: Aldamanhori R, Inman R, The treatment of complex female urethral pathology, Asian Journal of Urology (2018), <https://doi.org/10.1016/j.ajur.2018.03.003>

urethral strictures and urethral diverticulae (UD). Increasing recognition of these conditions has led to the development of more refined diagnostic techniques and treatments. In addition, the development of specialist referral centers has led to publish reports of larger case series leading to a wider evidence base to guide diagnosis and treatment.

## 2. UD

### 2.1. Definition

UD are abnormal, periurethral, urine filled cystic structures that are connected to the urethra via an ostium. Differential diagnoses include periurethral cysts, and benign and malignant tumors of the periurethral tissues.

### 2.2. Symptoms

UD classically present with dysuria, urethral discharge, and dyspareunia, commonly with anterior vaginal wall mass and insensible post micturition incontinence [3]. Symptoms of urinary or local infection occur in 33%, which together with LUTS are the presenting complaint in 91% of patients [4]. Occasionally, symptoms are due to rare complications such as stones or tumor, which have developed in a diverticulum. These complications may present with increasing discomfort or pain, urinary tract infections or hematuria. However about 10% of UD are completely asymptomatic, and incidentally encountered on physical examination, imaging or perioperatively during vaginal surgery [4].

The non specific presenting symptoms often lead to delay in diagnosis, which was estimated to be between 11 and 72 months in one study [5]. A high index of suspicion is required to avoid this. When atypical incontinence (post micturition and often insensible), persistent urethral discomfort, or atypical symptoms and LUTS occur, appropriate investigations are needed to exclude UD if diagnosis was not apparent on examination.

### 2.3. Epidemiology

In 1805, Hey [6] first described UD which were rarely diagnosed until the 1950s when positive pressure urethrography was developed. Increasing awareness of UD together with better imaging techniques particularly MRI has made the diagnosis of UD increasingly common. Moreover, symptomatic UD are still rare affecting 1%–6% of adult women [7]. A total of 40% of women investigated for LUTS have been noted to have UD [8]. UD are found in 80% of patients presenting with periurethral masses [4].

### 2.4. Pathogenesis

UD are thought to be acquired conditions and there are two main theories regarding the pathogenesis. UD are thought to develop due to obstruction, inflammation, and infection of the periurethral glands causing dilatation [9]. The location of UD mimics the distribution of periurethral glands and the rare association of adenocarcinoma in UD supports

the glandular origin. UD often present after childbirth suggesting that trauma from vaginal childbirth may be important, yet 20%–30% of patients in some series are nulliparous, suggesting that trauma may predispose to UD but is not necessary [10].

UD are most commonly situated dorsally and in the midurethra. In the largest series of UD, location was mid-urethral (52%), followed by distal (27%), proximal (19%), and full length (2%) [11]. Most were single (81%), followed by multiloculated (13%) and then saddle shaped (6%) [11]. UD vary in size from 8 mm to 48 mm [11].

### 2.5. Diagnosis

To make a diagnosis of UD requires a combination of a thorough history and physical examination, correct laboratory studies, endoscopic examination of the bladder and urethra, and imaging. It is important to have a high index of suspicion for UD in women presenting with atypical or persistent LUTS to avoid missing the diagnosis. During physical examination, the anterior vaginal wall should be palpated for the telltale swelling and tenderness of UD. Expressing pus or urine manually from the urethra during pelvic examination is highly suggestive of UD, particularly if the swelling subsequently disappears, although this sign is not present in the majority of patients [12].

Cystourethroscopy, which can be performed under local anesthesia, can detect an ostium to the diverticulum in 42% patients and rules out any coexisting urethral or vesical pathology [13]. Urodynamic studies may be helpful in ruling out coexisting voiding dysfunction or stress urinary incontinence, and the UD may be detected during a post voiding X-ray in 25% [11]. Pelvic ultrasound is a non-invasive method for detecting UD and has detected 38% of UD in one study, but is operator dependent and may miss small UD [11]. Previously, a range of other radiological investigations has been described to diagnose UD, including voiding cystourethrogram and double balloon urethrography. Currently MRI represents the most accurate and informative imaging modality. Postvoiding sagittal pelvic MRI was able to diagnose UD in 100% of patients, with 100% sensitivity in detecting UD [14]. MRI offers excellent anatomical detail, allowing characterization of the configuration of the UD and its relationship to the urethra, which helps to plan the approach for surgery. Post voiding sagittal MRI has become the gold standard for diagnosis of UD and is recommended in all patients in whom UD needs excluding or to confirm clinical findings and plan surgery.

### 2.6. Treatment options

Asymptomatic UD may require no intervention, although if encountered inadvertently during vaginal surgery may be treated on their merits. If detected during surgery for stress incontinence it may be better to deal with the diverticulum and leave the incontinence surgery for another occasion.

Symptomatic UD may be managed with minimally invasive methods such as endoscopic coagulation, marsupialization, fulguration or endoscopic or open incision and drainage.

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