

Urethral Diverticulum in Women: Retrospective Case Series

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Abstract

Purpose We present the management of 17 cases of urethral diverticulum in our department. We describe the various clinical presentations of urethral diverticulum, which may mimic other pelvic floor disorders and result in diagnostic delay.

Materials and Methods We reviewed 17 cases of urethral diverticulum presented to the urogynaecology department between January 2006 and February 2011 retrospectively.

Patient demographics, history, clinical evaluation, diagnostic modalities, and management plans were reviewed. All of them underwent Magnetic Resonance Imaging (MRI) prior to the procedure.

Results The mean time from onset of symptoms to diagnosis of a urethral diverticulum was 24 ± 5.6 months. MRI identified the urethral diverticulum in all cases while voiding cystourethrography confirmed the diagnosis in 4 (23.5 %). They have been divided into two groups: Group A, (4–6 mm largest axis range) 5 (29.41 %) cases; Group B, (6–33 mm largest axis range) 12 (70.59 %). All in Group A were symptomatic with recurrent Urinary Tract Infection (UTI), whereas only 8 (66.6 %) in Group B were symptomatic. Transvaginal diverticulectomy was done in 12 women who were symptomatic (70.5 %). Postoperative evaluation revealed complete resolution of symptoms, such as recurrent UTI, dysuria, and dyspareunia. One patient was unsure of surgery, while conservative approach was opted for asymptomatic patients 4 (23.5 %). The use of

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preoperative MRI altered the management in 2 (11.7 %) women.

Conclusion The diagnosis of urethral diverticulum should be considered in women with recurrent UTI, dysuria, dyspareunia, and irritative voiding symptoms not responding to conservative therapy.

Keywords Urethral diverticulum · Diagnosis · Women · Magnetic resonance imaging

Abbreviations

MRI	Magnetic Resonance Imaging
UTI	Urinary Tract Infection
UD	Urethral Diverticulum
VCUG	Voiding Cystourethrogram

Introduction

In 1805, William Hay first described a female with sub-urethral diverticulum in the medical literature. The definition of a diverticulum according to Dorland's Medical Dictionary is "a pouch or sac occurring normally or created by herniation of the lining mucous membrane through a defect in the muscular coat of a tubular organ." Urethral Diverticulum (UD) is defined as a localized out pouching of the urethra into the anterior vaginal wall [1].

The etiology of urethral diverticulum is uncertain, although the widely quoted theory postulated that obstruction of one or more of para urethral ducts may result in the formation of retention cyst within the para urethral gland. Later infection supervenes and results in abscess formation and rupture back into the urethral lumen. Epithelialisation of the ruptured tract results in formation of the neck of the diverticulum [1].

Physical examination findings may be striking, subtle, or completely absent. The appreciated findings may be dictated by the natural history of the disorder and the presence or absence of acute infection. On examination, the most common finding is an anterior vaginal mass underlying the urethra, detectable in up to 90.5 % of symptomatic patients [2].

A variety of modalities are available to confirm the diagnosis, including cystoscopy, ultrasonography, voiding cystourethrogram (VCUG), and double-balloon catheter study. The recent advances with magnetic resonance imaging (MRI) have made MRI a promising diagnostic option.

Surgery is the mainstay of therapy for UD. Surgical procedures are usually done vaginally by diverticulectomy,

partial ablation, or simple marsupialisation (the Spence procedure) for distal diverticula [3].

In this study, we describe various clinical presentations of urethral diverticulum, which may mimic other pelvic floor disorders and result in a diagnostic delay. We also reviewed the surgical outcomes of transvaginal diverticulectomies on symptomatic women.

Materials and Methods

We reviewed 17 cases of urethral diverticulum presented to the urogynaecology department between January 2006 and February 2011 retrospectively. Their case notes were reviewed. Patient demographics, history, clinical evaluation, diagnostic modalities, and management plans were assessed. Radiological imaging included Magnetic Resonance Imaging (MRI) for all and VCUG in some women prior to the procedure. Operative procedures were performed mainly by the consultant urogynaecologist and in collaboration with the urologist in the selected cases. Informed consent was undertaken for all women prior to the procedure. As this retrospective study was registered with the clinical effectiveness department, ethical approval was not required.

All women underwent cystourethroscopy simultaneously to try and identify the diverticular opening, and also to exclude any bladder pathology. A 14Fr Foley catheter is used during all cases. 5–20 ml of 0.25 % bupivacaine with 1:200,000 adrenaline-saline was used to infiltrate the area around the urethral diverticulum. An inverted "U" shaped incision was made along the anterior vaginal wall. An anterior vaginal wall flap was created by careful dissection in the potential space between the vaginal wall and the peri-urethral space. The diverticulum was identified through the peri-urethral fascia by visualization, palpation, or needle aspiration and also with the help of MRI images.

The peri-urethral fascia was incised transversely, and the sac was grasped and dissected back to its origin on the urethra within the leaves of the peri-urethral fascia. The connection to the urethra was identified, and the walls of the diverticulum were completely excised. The defect was closed in a three-layer fashion consisting of the urethral wall, peri-urethral fascia, and the vagina. Martius fat pad interposition was not used in our patients.

All women were discharged home on the same day with the catheter in situ. The catheter was removed between 10 and 14 days. Cure was defined as a complete resolution of symptoms. All women were followed up at 6 weeks by the urogynaecology nurse specialist and between 3 and 4 months and again at 12 months by the consultant

Table 1 Patient characteristics

Mean age (range)	45.6 ± 17.3 (34–73)
Recurrent urinary tract infection	10 (58.8 %)
Dyspareunia	7 (42.2 %)
Urgency	7 (42.2 %)
Frequency	7 (42.2 %)
Cystocele	4 (23.5 %)
Incidental finding	5 (29.4 %)

urogynaecologist. Thereafter, they were followed only if required.

Results

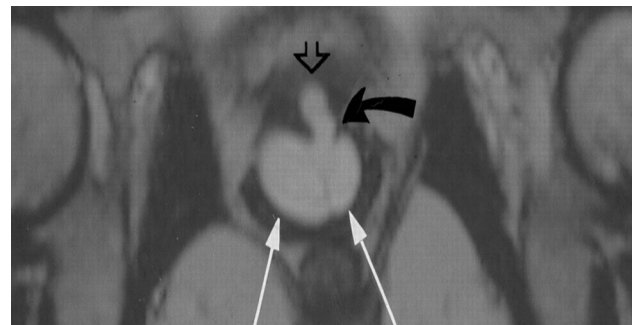
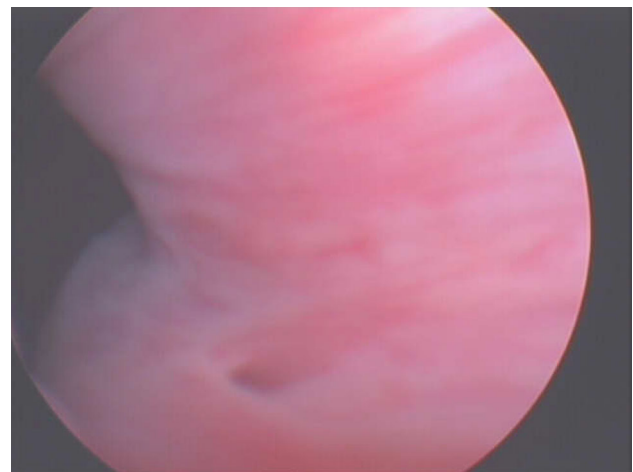
Table 1 illustrates the demographic and clinical features in this cohort of women. Mean patient age was 45.6 ± 17.3 (range 34–73). The peak incidence of diagnosis was in the third and fourth decades of life. 13/17 (76.5 %) were symptomatic of which the most commonly reported symptom was recurrent urinary tract infections (UTI) 10 (58.8 %). Concomitant cystocele was present in 4 (23.5 %) women. The diverticulum was suspected in 5 cases (29.4 %) where the patients were referred with the anterior vaginal mass. The mean time from the onset of symptoms to the diagnosis of a urethral diverticulum was 24 ± 5.6 months.

Magnetic Resonance Imaging (MRI) identified the urethral diverticulum in all cases (100 %) while voiding cystourethrography confirmed the diagnosis in 4 women (23.5 %). The findings by MRI, cystoscopy, and the clinical examination are given in Table 2. On the basis of MRI findings and the symptomatology, they have been divided into two groups: Group A, (4–6 mm largest axis range) 5 (29.41 %) cases; Group B, (6–33 mm largest axis range) 12 (70.59 %). All in Group A (the smaller in size) were symptomatic with recurrent UTI, whereas only 8 (66.6 %) in Group B were symptomatic. The largest diverticulum in our study was 33 mm by the largest axis on MRI. Simple type on configuration 9 (53 %) dominates in this series. Among the horseshoe category, partial is predominant in 7 (41 %) cases, which is illustrated in Fig. 1.

Transvaginal diverticulectomy under cystoscopic guidance was done in 12 women who were symptomatic (70.5 %). One woman declined surgery. Cystourethroscopic appearance of the luminal opening of one of the diverticula is shown in Fig. 2. Postoperative evaluation revealed complete resolution of symptoms in the majority of cases (10/12–83.3 %), which included recurrent UTI, dysuria, and dyspareunia. One patient developed de novo Stress Urinary Incontinence (SUI) that was confirmed on video urodynamics. This was managed with transobturator

Table 2 Findings by magnetic resonance imaging, clinical, and cystoscopy

Mean diverticular size mm (range)	1.2 ± 0.98 (4–33)
Types by MRI	
Simple	9 (53 %)
Partial horseshoe	7 (41 %)
Circumferential horseshoe	1 (6 %)
Location by clinical & cystoscopy	
Proximal	2 (11.7 %)
Middle	12 (70.6 %)
Distal	2 (11.7 %)
Undifferentiated	1 (6 %)

**Fig. 1** MRI imaging of Partial horseshoe diverticulum**Fig. 2** Cystourethroscopic appearance of urethral diverticular luminal opening

tape (outside-in) technique. Following this, patient did not have any recurrence of symptoms. Another patient developed the recurrence of symptoms in the form of UTI, urgency, and frequency. This symptom was controlled with low-dose antibiotic therapy, as repeat MRI did not reveal

any evidence of diverticulum. One diverticulum was detected and confirmed during pregnancy. Therefore, the procedure was performed 3 months after delivery. One patient was unsure of surgery, while conservative approach was opted by asymptomatic patients 4 (23.5 %). The use of preoperative MRI altered the management in 4 (23.5 %) women who were originally scheduled for anterior colporrhaphy. In view of the urinary symptoms and suspicion of diverticulum, an MRI was requested which confirmed diverticulum. In view of co-existent cystocele, both anterior colporrhaphy and the urethral diverticulectomy were carried out in these women.

Discussion

The incidence of urethral diverticulum varies between 3 and 40 %, mainly in patients with persistent lower urinary tract symptoms [4]. The incidence of the urethral diverticulum is difficult to estimate as the presentation is usually vague and nonspecific [5]. It is not surprising that there has been a significant diagnostic delay in majority of the case series including this study. The mean time from the onset of symptoms to the diagnosis in our study is 24 months, which is comparable to most of the reported series [2, 6].

Recurrent UTI was the most commonly reported symptom in this series. Most of these women were treated for UTI, dyspareunia, and the irritative urinary symptoms. High Index of suspicion of urethral diverticulum is necessary in women with chronic irritative symptoms, not responding to conventional treatments. In our study, it was noticed that the diagnosis of urethral diverticulum in 5 (29.4 %) women was made when the patients were referred with the anterior vaginal mass [7, 8]. This shows that the clinical presentation of urethral Diverticula varies considerably from patient to patient and also may vary depending on when during the natural history of the disorder the diagnosis is made. Moreover, none of our patients presented with the all of classical clinical triad of dribbling, dyspareunia, and dysuria unlike some other series. It has been found individually or collectively that these symptoms triads are neither sensitive nor specific for urethral diverticulum [9].

The recent increasing incidence is primarily due to the advances in the imaging assessment and the clinical awareness of this condition. This series had a mix of cystourethroscopy, MRI, and the VCUg. It is noted that the cystourethroscopy offers no structural or dynamic information to guide the intervention and is valuable to exclude any other pathology. In our unit, the diagnosis of urethral diverticulum has increased due to easy availability of MRI. MRI is probably the most sensitive method of securing a diagnosis when traditional workup of a vaginal wall mass

has yielded inconclusive results [10, 11]. T2-weighted images are more effective with urethral diverticula because the lumen appears hyper dense [11, 12].

On the basis of MRI, the frequency of the size, and the symptomatology, we divided the groups into a smaller diverticulum (Group A) and a larger diverticulum (Group B). This study has the limitation of the smaller number overall, and the number (5–29.4 %) of patients in the Group A was small too. However, it was thought that it would be appropriate to classify into two groups due to the persistent symptomatology in the smaller diverticular group.

Based on the literature review [11, 12] and also on our own experience, we proposed that 6 mm is the cutoff for differentiating the urethral diverticulum into smaller and larger size. Despite the fact that the Group B is easy to diagnose by clinical examination, all of the women with the smaller diverticulum were symptomatic. The size of the diverticulum does not correlate with the clinical symptoms. Only two-third of patients in Group B (i.e., large diverticular group) showed evidence of symptoms. Pain is a common presenting complaint, accounting for symptoms in up to 48 % of women with Diverticula.

There have been a number of studies claiming various modalities of imaging [12]. However, this study confirms that MRI imaging is the best way of assessing the presence of urethral diverticula in women, which concurs with the majority of the other studies [10, 11, 13, 14].

This study has few limitations. This is a retrospective case series. The follow-up was not consistent; majority of the patients 88 % were followed only up to 12 months with or without surgery. The other 12 % were followed for more than 2 years due to the persistence of symptoms and de novo SUI. We were unable to obtain information concerning quality of life, urinary, and sexual function before and after surgery as there is no validated questionnaire developed specifically for this condition. We wish to address these issues including Patient Reported Outcome Measures (PROMS) to assess the efficacy of the procedure from the patients' perspective.

In our study albeit being small, only one patient developed de novo stress urinary incontinence. We waited 3 months before offering mid-urethral tape procedure. Therefore, we believe that the delay in offering the treatment instead of concurrent mid-urethral tape procedure reduces the incidence of procedure-related serious complication (e.g., fistula) [9].

Transvaginal approach is the ideal surgical technique for posterior urethral diverticulum [2]. Difficulties with surgical excision can arise in a variety of circumstances. Surgical planes can be obliterated by the sequela of chronic and acute infection. Bleeding can obscure visualization of the diverticular sac. Inability to keep the sac distended can

be a significant problem for dissection and excision. Adherence to the strict surgical principles enables us to identify the diverticulum easily and repair the defect without difficulty. Exposure and visualization was critical to treatment in these cases [13].

We also suggest that asymptomatic women may not require surgical intervention although the size of the diverticula is larger in this group [15]. In this cohort, the small UD was diagnosed earlier because the patients were symptomatic and resistant to conservative therapy. All of these women in Group A presented with the recurrent UTI but resistant to antibacterial therapy for more than 12 months. Hence, MRI was done which confirmed UD. We actually do not know the real prevalence of asymptomatic small or large UD in the general population. Women with the anterior vaginal mass with the irritative urinary symptoms may have underlying diverticulum [7, 8].

Conclusions

Urethral diverticulum should be considered in women with recurrent UTI, dysuria, dyspareunia, and irritative voiding symptoms not responding to conservative therapy. Surgical excision is the treatment of choice for symptomatic patients [2, 5]. Asymptomatic patients can be followed up conservatively [15].

Compliance with ethical requirements and Conflict of interest Informed consent was obtained from all patients for being included in the study. As this project was registered with the clinical effectiveness department, ethical approval was not required. The authors declare that they have no conflict of interest.

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