Periurethral Masses: Etiology and Diagnosis in a Large Series of Women

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OBJECTIVE: **To describe the differential diagnosis of periurethral masses in a consecutive series extracted from a single tertiary urogynecologic practice database.**

METHODS: **A patient database of a private urology and urogynecology practice with 1,950 women was searched for patients who were found to have a periurethral mass during the accrual dates of 1994 to 2002, and these records were reviewed for diagnostic testing and results. All women provided a history, completed a questionnaire, and underwent physical examination, voiding diary, cystoscopy, and videourodynamic testing; selected patients then underwent additional imaging.**

RESULTS: **Seventy-nine (4%) patients aged 41.2 ± 14 years were identified. Of these, 72 (91%) had been referred for evaluation of persistent irritative lower urinary tract symptoms or incontinence. Seven patients (9%) had been referred specifically because of a periurethral mass. Sixty-six patients (84%; 95% confidence interval [CI] 73%, 91%) had urethral diverticula, of which 4 (6%; 95% CI 2%, 14.8%) contained malignancies. Six patients (7%; 95% CI 3%, 15%) had vaginal cysts histologically identified as fibromuscular tissue, 4 (5%; 95% CI 1%, 12%) had leiomyomata, and 2 (2.5%; 95% CI 0.03%, 8.8%) had ectopic ureteroceles. Two patients had vaginal squamous cell carcinomas (2.5%; 95% CI 0.03%, 8.8%), and 1 had an infected granuloma. Masses were palpable in 42 patients (53.8%; 95% CI 42%, 64%) and in 37 patients either were encountered at surgery (n = 5) or were urethral diverticula diagnosed by voiding cystourethrogram (n = 32).**

CONCLUSION: **Periurethral masses were encountered in less than 4% of our patient sample. Most masses were urethral diverticula; however, the differential diagnosis included leiomyoma, vaginal cysts, and malignancy. Masses were generally either palpable or seen at imaging studies performed during evaluation of lower urinary tract symptoms. (Obstet Gynecol 2004;103:842–7. © 2004 by The American College of Obstetricians and Gynecologists.)**

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LEVEL OF EVIDENCE: III

There are few reports in the literature describing evaluation, differential diagnosis, and treatment of periurethral masses in women. Consequently, when a physician is confronted with such a mass as either a chief complaint or incidental finding in the evaluation of a patient, consideration of the differential diagnosis and choice of the appropriate diagnostic tests can be challenging. Herein, we report our experience with 79 consecutive patients who were found to have a periurethral mass, reviewing their presentation, the diagnostic techniques we used, and the pathological findings, as well as the findings of other investigators who have addressed this clinical problem.

MATERIALS AND METHODS

A patient database of a private urology practice specializing in female urology with 1,950 women was searched for all patients who were found to have a periurethral mass during the accrual dates of 1994 to 2002. Patient histories and surgeries were searched using the terms "mass," "urethral," "periurethral," and "vaginal." All patients were fully evaluated by history, questionnaire, physical examination, voiding diary, uroflow, and measurement of postvoid residual urine, with cystoscopy and videourodynamic testing performed in patients with lower urinary tract symptoms. Selected patients also had magnetic resonance imaging (MRI), computed tomography (CT), or double-balloon urethrography. Descriptive data are presented as frequencies and proportions with 95% confidence intervals (CIs). Confidence intervals were calculated by using the binomial distribution (True Epistat, 1994). The study was approved by the Institutional Review Board of Lenox Hill Hospital.

RESULTS

Seventy-nine women were identified from the database. They ranged in age from 16 to 64 years with mean age of 41.2 ± 14 years. Of these, 72 women (91%) had been

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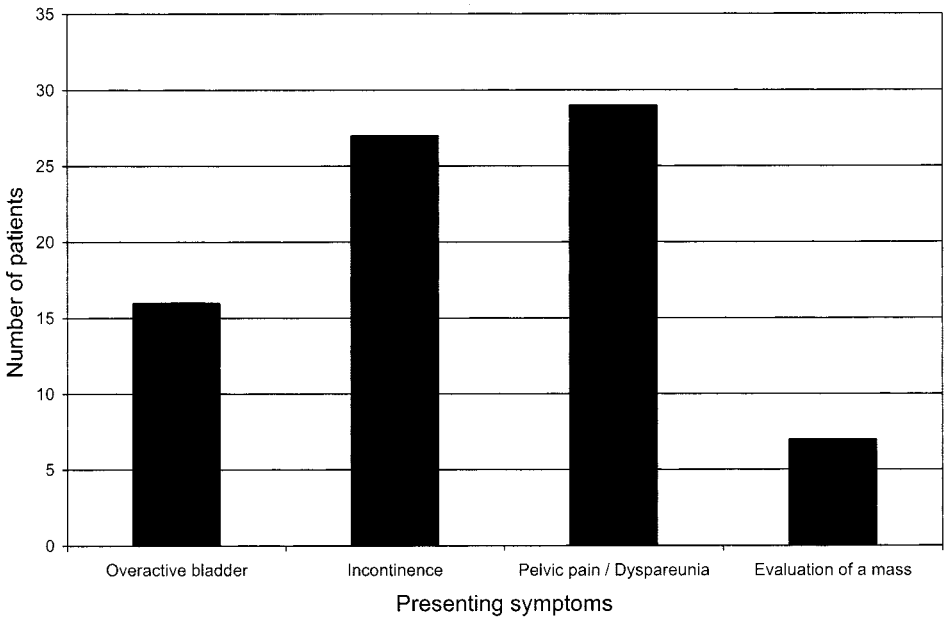

Figure 1. Presentation of patients found to have a periurethral mass. Presenting symptoms are listed.

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referred for evaluation of refractory lower urinary tract symptoms, including overactive bladder, dysuria, pelvic pain, and recurrent lower urinary tract infection (Figure 1). Seven patients (9%) had been referred specifically for treatment of a periurethral mass.

Periurethral masses were encountered at physical examination (n = 42; 53.8%; 95% CI 42%, 64%), during voiding cystourethrogram (VCUG; n = 32; 41%; 95% CI 29.6%, 52%), or incidentally during vaginal surgery (n = 5; 6%; 95% CI 2%, 14.8%; Figure 2). Seventy-five patients (96%) underwent surgery. The pathologic diagnoses among the palpable periurethral masses included urethral diverticulum leiomyoma, vaginal carcinoma, ectopic ureterocele, granuloma, and vaginal cysts and are listed in Table 1. Overall, 66 patients (84%; 95% CI 73%, 91%) had urethral diverticula, including 4 (6%; 95% CI 2%, 14.8%) that contained malignancies. Two small palpable masses that were not observed on either

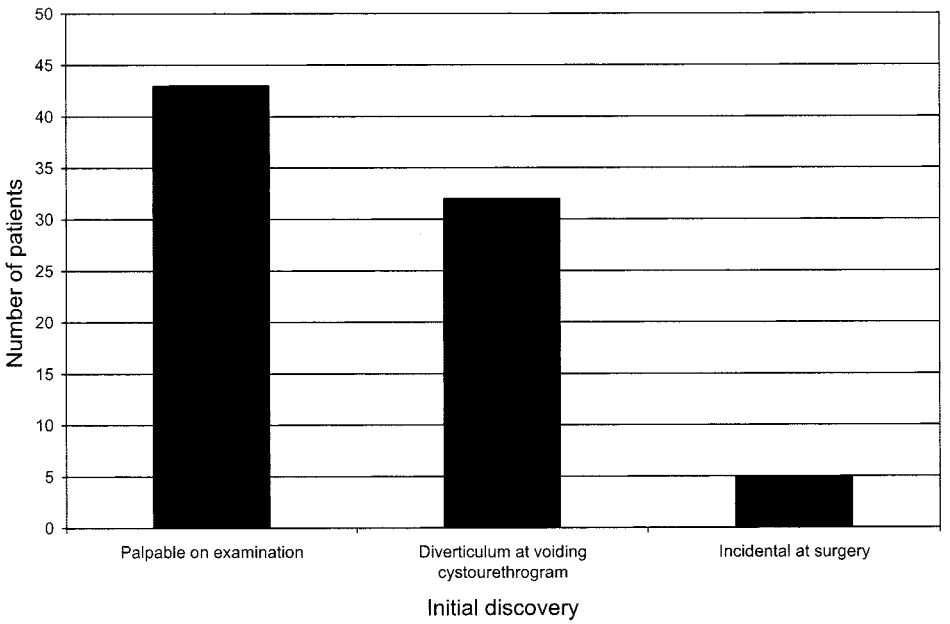

Figure 2. Periurethral mass: initial discovery. Masses were encountered on physical examination, at imaging, or during the course of surgery.

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Table 1. Final Diagnosis of Periurethral Mass and Frequency

Diagnosis	N (%)	95% Confidence interval (%)
Urethral diverticulum	66 (84)	73, 91
Diverticulum with malignancy	4 (6)	2, 14.8
Vaginal cyst	6 (7)	3, 15
Leiomyoma	4 (5)	1, 12
Vaginal squamous cell carcinoma	2 (2.5)	0.03, 8.8
Ectopic ureter	2 (2.5)	0.03, 8.8
Granuloma	1 (1)	0.03, 6.8

VCUG or MRI (performed in an effort to characterize the palpable masses) were confirmed by histopathological and surgical examination to be urethral diverticula.

Sixty-two women underwent complete or partial urethral diverticulectomy. Preoperative CT scan or MRI failed to identify carcinoma in any of the patients with malignancies (Figure 3), either prospectively or retrospectively. The 3 patients with adenocarcinoma all had positive surgical margins. After treatment by anterior pelvic exenteration and postoperative brachytherapy, 1 patient with adenocarcinoma is currently alive but has recurrent disease after 2 years, and the other 2 patients died approximately 2 years postoperatively. The patient with squamous cell cancer had negative margins with a single positive perivesical lymph node and is currently without evidence of recurrent disease 8 years postoperatively.

One patient who presented with a 20-year history of severe dysuria refractory to empiric treatments was found to have a multiloculated urethral diverticulum extensively undermining the periurethral tissue and underwent urethral reconstruction with Martius flap interposition. After failure of the reconstruction, she ultimately underwent continent urinary diversion.

Four patients (5%; 95% CI 1%, 12%) were found to have leiomyomata. These masses were all readily apparent on physical examination as firm, nontender, ovoid or spherical, and freely moveable 2- to 3-cm masses in the anterior vaginal wall adjacent to the urethra[1] or bladder neck.[2] All 4 patients underwent VCUG, CT scanning, and MRI; none of the masses was apparent radiographically.

Six patients (7%; 95% CI 3%, 15%) had vaginal cysts that were histologically identified as fibromuscular tissue and that contained sterile, thick, reddish-brown fluid. All but 1 of these was found incidentally at the time of pubovaginal sling operation in women with recurrent incontinence after vaginal wall sling. One cyst was palpable preoperatively; all cysts presented as a soft fullness between the anterior vaginal wall and the urethra that did not appear to be a discrete mass until it was dissected free of surrounding tissue.

Two patients (2.5%; 95% CI 0.03%, 8.8%) had vaginal squamous cell carcinomas. These presented as obviously indurated, erythematous, solid periurethral masses. In both cases, it was possible to excise the distal one half of the urethra and obtain clear margins. One of these women died of complications related to cardiac surgery

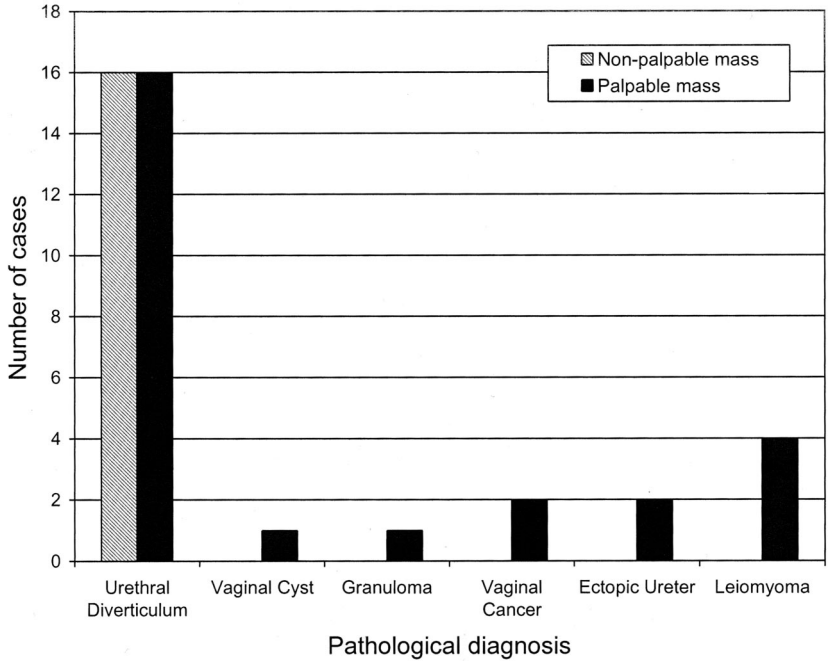

Figure 3. Pathological diagnosis of palpable periurethral masses. Nonpalpable masses were often urethral diverticula. Among the palpable masses, diverticulum was also the most common diagnosis.
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performed 1 month postoperatively whereas the other patient was lost to follow-up.

Two women (2.5%; 95% CI 0.03%, 8.8%) had ectopic ureteroceles. Both were discovered on physical examination during evaluation of urinary incontinence. The diagnosis was confirmed by intravenous pyelography after cystoscopy showed only a contralateral ureteral orifice. The remaining 2 patients had an inclusion cyst and a granuloma from a prior anti-incontinence operation.

In our series, a periurethral mass discovered incidentally was overwhelmingly likely to be a urethral diverticulum found at VCUG (32 of 37 palpable masses, 86%; 95% CI 71%, 95%); the remaining incidental findings were all vaginal wall cysts (5 of 37; 14% ; 95% CI 4.5%, 28.7%). The differential diagnosis of the palpable masses is presented in Figure 3.

DISCUSSION

There are few reported case series that specifically address periurethral masses in women, and for that reason it is difficult to assess the relative incidence of the lesions that encompass the differential diagnosis. Benign etiologies include urethral caruncles, Skene's gland abscess/cysts, mucosal prolapse, ectopic ureterocele, urethral diverticulum, vaginal wall cyst, Gartner's duct cyst, leiomyoma, and hamartoma.[2] Rarely, malignant lesions present as periurethral masses, including adeno-, squamous cell, and transitional cell carcinoma, histiocytoma, and sarcoma.[1,3] Even less common are cancers in urethral diverticula.[4–7] It appears that of the true periurethral masses, urethral diverticula are by far the most common, with leiomyoma and possibly vaginal wall cysts a distant second and third.

In our series, periurethral masses presented in 1 of 3 ways: 1) during videourodynamic evaluation of women with refractory lower urinary tract symptoms; 2) as a visible and/or palpable mass discovered by the patient or doctor during physical examination; and 3) during dissection (or palpation) at the time of anti-incontinence surgery. In the first case, all of the periurethral masses proved to be urethral diverticula; in the latter 2, the pathology was varied, including diverticula, leiomyomata, vaginal wall cysts, and ectopic ureteroceles.

If a mass presents preoperatively, the next step in diagnostic evaluation after a thorough history and physical examination is radiographic imaging. Although there is some disagreement about the most accurate imaging modality, VCUG, MRI, CT scan, and double-balloon retrograde urography all have a high detection rate for urethral diverticula. Because of the possibility that a periurethral mass might affect micturition or continence, we prefer to do videourodynamics and cystoscopy as part of the definitive evaluation. In particular, with a single catheterization, videourodynamics combines voiding cystourethrography with multichannel urodynamic studies and addresses both anatomic and functional considerations.

In our small series, none of these imaging techniques detected solid lesions and none distinguished benign from malignant lesions. However, physical examination was surprisingly accurate (in retrospect) at providing clues to the diagnosis. An obvious palpable induration was present in 3 of 4 patients with cancer of a urethral diverticulum and in both patients with squamous cell carcinoma of the vagina. All 4 of the women with leiomyomata had discrete, firm, mobile, nontender masses; 3 of these were clearly separate from the urethra.

In our experience, VCUG has been an accurate way of diagnosing urethral diverticula. Voiding cystourethrogram was definitive in 64 (97%) of our 66 patients; however, it is not 100% sensitive and can fail to detect both complex diverticula as well as simple diverticula that fail to fill with contrast. In a study by Ganabathi et al,[8] VCUG correctly identified a urethral diverticulum in 60 (95%) of 63 cases. However, other investigators have reported less favorable detection rates and recommended positive-pressure urethrography using a double-balloon catheter,[9,10] and small but more recent series have reported encouraging results using transvaginal ultrasonography[11] and MRI.[12–15] Sharp et al (Sharp DS, Vasavada SP, Joseph AB, Daneshgari F, Jones JS, Rackley RR. Experience with magnetic resonance [MRI] evaluation of circumferential urethral diverticula. American Urological Association 2003 Annual Meeting, Chicago, IL, April 27, 2003. Abstract #357) recently reported on external coil T1 and T2 MRI in a series of 30 women with urethral diverticula, noting its superior performance over VCUG in the detection of circumferential diverticula. We find positive-pressure urethrography difficult to perform, and it is painful for the patient[16]; accordingly, we have all but abandoned its use except in rare cases. However, others, including Wang and Wang[10] and Jacoby and Rowbotham,[16] have found it to be even more sensitive than VCUG. Reliable criteria for the detection of rare malignancies in urethral diverticula have yet to be established (Sharp DS, et al. American Urological Association 2003 Annual Meeting, Chicago, IL, April 27, 2003. Abstract #357).[17]

Leiomyoma of the female bladder and urethra have been reported in 160–235 cases in the English literature,[18] but it is unclear how many of these had a urethral rather than periurethral origin. Yusim et al[19] reported that fewer than 40 cases of urethral leiomyoma have appeared in the literature; most occurred in the third decade of life and were associated with variable symp-

toms and size. Fontana et al[15] reported 2 leiomyomas in a series of 560 women who underwent transvaginal ultrasonography for lower urinary tract symptoms. The average age of presentation is reported to be 39.8 years,[19] and the typical tumor size has been variable with a range from 1 to 8 cm.[19] In our series, all patients with leiomyomata presented with similar physical findings: a smooth, round or ovoid, nontender, solid periurethral mass. The general recommendation is local excision alone because no malignant transformation has been documented.[18–20]

Urethral prolapse is a relatively uncommon condition that primarily affects African-American children with a reported mean age of 4.6 years or postmenopausal white women.[21,22] In 2 reports, 19 of 20 children and 9 of 12 children presented with complaints of vaginal bleeding.[21,22] Typically, a permeatal mass is discovered with a reddish/ purple hue.[21] Skene's duct cysts are exceedingly rare, with a total of 4 cases reported in the medical literature as of 1984.[23] Urethral caruncles are frequently asymptomatic but also may present as a mass, with or without pain, bleeding, discharge, or hematuria.[3] Urethral caruncles have a wide variation in appearance but are usually less than 1 cm in diameter and typically arise from the lower lip of the urethral meatus.[3]

Urethral tumors do not usually present as periurethral masses; the most common complaints of patients with urethral neoplasms were bleeding, bloody discharge, and hematuria.[1–3] The majority of the patients with urethral neoplasms were aged between 50 and 70 years at presentation.[1] The prognosis of patients with urethral carcinoma was poor, with a 5-year survival rate of 27%.[1] In Fontana et al,[15] 560 female patients with lower urinary tract symptoms underwent transvaginal ultrasonography with the demonstration of 3 carcinomas. Prolapsed ureteroceles are extremely rare in adult women; only 4 cases have been reported.[24]

The specialized nature of the investigators' practice in female urology and urogynecology explains the distribution of particular pathologies we encountered, the absence in our series of common gynecologic etiologies that are likely to be encountered and treated in the community, our patients' presenting symptoms, and the array of tests we ordered to evaluate them.

The 74 patients whose masses were discovered during the course of evaluation and therapy for lower urinary tract symptoms represented less than 4% of the close to 2,000 patients with lower urinary tract symptoms evaluated during the accrual period. More than half of the patients in our series had palpable masses, and most of the nonpalpable masses were diverticula that were almost universally detected by VCUG. For these reasons, we advocate VCUG as part of a videourodynamic study in the management of lower urinary tract dysfunction, and targeted imaging studies when a periurethral mass is encountered on physical examination.

Periurethral masses were encountered in less than 4% of our patient sample. Most masses were urethral diverticula; however, the differential diagnosis included leiomyoma, vaginal cysts, and malignancy. Masses were generally either palpable or observed on imaging studies that were performed during evaluation of lower urinary tract symptoms.

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