
Lower urinary tract leiomyoma: is excision necessary?

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Introduction/objectives: Our objective was to review our experience with lower urinary tract leiomyomata to determine if presentation, exam and imaging allows for stratification of the treatment of this rare lesion.

Materials and methods: A retrospective review of current practice was performed from the Mayo Clinic Rochester database identifying 13 female patients and 10 males from 1995-2008, focusing on the clinical presentation, cystoscopic findings, imaging and operative approaches.

Results: Symptomatic patients had larger lesions, were more likely to be females, or had midline periurethral or bladder neck lesions. Cystoscopic findings were uniformly described as submucosal polypoid lesions without surrounding erythema or mucosal involvement, a hallmark in the differential. There were no cases of rapid growth of these lesions. There were no

recurrences after complete excision with follow up ranging in some cases for up to 4 years.

Conclusions: Lower urinary tract urethral leiomyomata are benign lesions that can be clearly differentiated on the basis of modern imaging from malignant or other benign lesions. While these lesions can cause obstructive voiding symptoms, resection or excision is required only for relief of symptoms, and not for tissue confirmation. In comparison to the presentation of leiomyosarcoma, this benign mass presents with slowly progressive symptoms, is firm but with rounded contours on exam, mucosal ulceration is absent. Imaging confirms benign appearing, albeit, ectopic muscle tissue. Rare forms of metastatic uterine smooth muscle tumors are also easily differentiated from this lesion. Adoption of a conservative approach for the asymptomatic and benign appearing lesion appears prudent.

Key Words: leiomyoma, urethra, urination, bladder outlet obstruction

Introduction/objectives

Leiomyomas are benign tumors that arise from smooth muscle. First described by Virchow in 1854,¹ they most commonly affect the uterus occurring in the uterus of 20%-30% of women over 35 years old.² They can, however, appear in any location which normally contains smooth muscle; a recent article describes some of these unusual locations.³ Leiomyomas in the lower urinary tract, however, are a rare phenomenon with approximately 250 reported cases involving the bladder

and approximately 120 cases involving the urethra.^{4,5} Comprising less than 1% of all bladder tumors, they are nonetheless the most common benign soft tissue tumor of the bladder.⁶ Often discovered incidentally, leiomyomas can present with obstructive voiding, irritative voiding, flank pain, and hematuria.⁷ Disease processes associated with multiple soft tissue tumors, such as Cowden's syndrome, increases the likelihood of genitourinary involvement. Most lesions are less than 5 cm but have been reported as large as 30 cm.⁸ The differential diagnosis includes malignancies of the genitourinary tract, including rhabdomyosarcoma, but also includes atypical urethral caruncle and malakoplakia. Urethral diverticulum, prolapsed ectopic ureterocele, Gartner duct cyst are easily differentiated on the basis of imaging a cystic lesion.

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Many of these benign lesions are treated surgically.^{9,10} We wondered if modern imaging in concert with a typical cystoscopic appearance would safely allow for non-surgical management of the asymptomatic lesion, reserving a conservative operative treatment of the symptomatic lesion. Location, therefore, would allow further stratification as to the risk of symptom development, as well as the necessity for excision and the operative approach.⁹

Materials and methods

After IRB approval of the retrospective chart review from 1995-2008, using bladder and urethral leiomyoma as our search terms, there were 13 females and 10 males identified who consented to use of their records

via signed Protected Health Information Consent, under HIPPA provisions. Chart and imaging review emphasized the presentation, size, location, endoscopic appearance, and if performed, the operative indication, operative approach, pathologic report as well as longitudinal follow up in the same or another anatomic location. The patients included in the prior Mayo review⁹ were specifically excluded from this review.

Results

A total of 23 patients, giving permission for inclusion in this study, were found in the Mayo Clinic database from 1995-2008, Table 1. The ages ranged from 27 to 83 years old (mean 59 years, median 65 years). All self-reported themselves as Caucasian.

TABLE 1. Lower urinary tract leiomyoma

Age	Sex	Presenting symptoms	Findings at cystoscopy	Size (cm)	Location
33	F	Incidental	Normal	1.2 x 1	Extravesical
69	F	Incidental	Bladder lesion	0.6	Endovesical
60	F	Hematuria*	Polypoid/bladder lesion	1	Endovesical
46	F	Incidental	Posterior wall mass	4.5 x 4	Intramural
27	F	LUTS	Urethral obstruction	1.9 x 1.6	Urethral
70	F	Incidental	None	1 x 1	Extravesical
41	F	Incidental	None	Unknown	Extravesical
54	F	LUTS	Peri-urethral mass	2.4 x 1.2	Peri-urethral
69	F	LUTS	Submucosal mass	1.5	Endovesical
78	F	Incidental	None	2.5	Extravesical
44	F	LUTS	Submucosal mass	1.8	Endovesical
52	F	LUTS	Urethral obstruction	3.4 x 3	Peri-urethral
65	F	LUTS	None	2.7 x 1.8	Peri-urethral
72	M	Incidental	Submucosal lesion, R UO	0.4	Endovesical
70	M	Incidental	Submucosal lesion, trigone	0.5 x 0.5	Endovesical
83	M	LUTS	Submucosal mass, L UO	0.7	Endovesical
68	M	Hematuria*	Submucosal lesion, L UO	2 x 1	Endovesical
73	M	Incidental	Submucosal lesion, L UO	0.5	Endovesical
73	M	Incidental	Submucosal lesion, L wall	0.7 x 0.5	Endovesical
71	M	Hematuria*	Submucosal lesion, trigone	1 x 0.5	Endovesical
52	M	Hematuria	Submucosal lesion, L wall	8 x 7	Intramural
40	M	Incidental	Submucosal lesion, R trigone	4.5 x 2.8	Intramural
51	M	Incidental	Submucosal lesion, dome of bladder	2.6 x 2.2	Intramural

*LUTS = lower urinary tract symptoms

*Incidental at cystoscopy for evaluation of microscopic hematuria

While the male to female gender was roughly even at 13 females to 10 males, more females presented with voiding dysfunction and with lesions of larger size: 6 of the 13 females presented with voiding dysfunction; the mean tumor size for this cohort was 1.9 cm. The seven other females cases were found incidentally, either at the time of cystoscopy for unrelated symptoms or at the time of resection for a trans-abdominal procedure; the average size of lesion for this cohort was 1.48 cm (median = 1.25).

Symptomatic patients had larger lesions, were more likely to be female (6 out of 13 women compared with 1 in 10 men were symptomatic), and all lesions causing voiding symptoms were in the midline. Asymptomatic patients were male-predominant, smaller and off the midline. In men, leiomyoma were found incidentally at cystoscopy or CT imaging in 9 of 10 cases with an average size of 0.53 cm (median 0.5 cm).

Cystoscopic findings in 8 female patients and 10 male patients were described as submucosal polypoid lesions; no patients had any associated erythema or mucosal abnormalities. The average age of men and women was different by > 10 years. The age at presentation for females averaged 53 years (range 27 to 78) with the males presenting at an average of 65 years (range 40 to 73). There were no recurrences recorded after complete excision. All lesions in this series were single.

Patient concerns regarding spontaneous growth during future pregnancies led to surgical enucleation

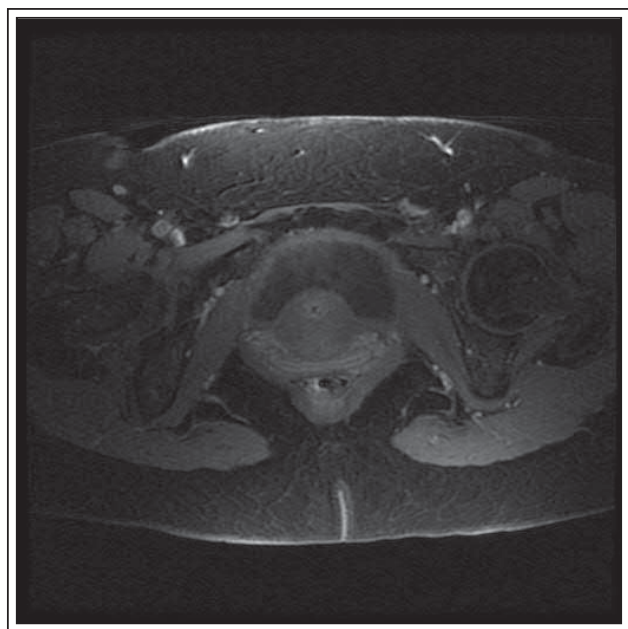


Figure 1. T2 weighted MRI showing circumferential urethral mass.

in one nulliparous female with a 3 cm distal urethral lesion. Despite the absence of pelvic symptoms, uterine leiomyoma and reassurances that the risk of “malignant transformation” in published series is 0%, she requested enucleation. She remains asymptomatic at 9 months follow up.

These lesions can grow quite large and may require complex urethral reconstruction and/or urethrectomy. A female patient presented with years of slowly progressive irritative voiding symptoms culminating in overflow incontinence secondary to a 3.4 cm by 3.0 cm by 2.0 cm circumferential peri-urethral mass involving and compressing the bladder neck, Figure 1. She underwent total urethrectomy, transvaginal bladder neck closure with a continent catheterizable stoma. She remains asymptomatic at 2 years follow up.

Discussion

Despite the 50% prevalence of uterine leiomyomata in women,¹¹ leiomyomas of the lower urinary tract are a rare phenomenon. This represents the largest case series of men and women with urinary leiomyomata in the literature. The diagnosis is likely increasing in prevalence due to improvements in modern imaging and increasing evaluation for microscopic hematuria; most leiomyoma are detected incidentally at the time of imaging or an unrelated surgical procedure. On review of the Mayo Clinic database found 23 patients over 13 years (1.7 patients a year). Whereas previous Mayo Clinic review found 34 patients over a 55 year period (0.6 patients a year).

The male to female ratio herein shows a slight predominance in women, similar to the Cornella review.⁹ Other reviews have also shown a female predilection in their cohort.⁷

The classic cystoscopic appearance is that of a benign lesion; a small submucosal polypoid mass without mucosal changes appears to be a reliable hallmark. The MRI appearance is of smooth muscle on T1 and T2 weighted images.

Rapid growth during pregnancy has not been reported with lower urinary leiomyomata while rarely reported with uterine fibroids. Spontaneous growth of uterine leiomyomata only rarely occurs during pregnancy.¹² Furthermore, the long-held thought that uterine leiomyomata are associated with a decrease in fecundity is now the subject of considerable debate.^{13,14}

Urinary leiomyomata are benign lesions, and do not undergo malignant transformation. Cytogenetic analysis suggest that leiomyosarcoma occur *de novo* and are cytogenetically unrelated to the benign lesion.¹⁵ Extrapolating from available data

on cancer risk in identical tissues in other locations (i.e. uterine fibroids) malignant transformation is estimated at 0.23% in a study of over 1300 patient who underwent hysterectomy for uterine leiomyoma. In a subpopulation of these patients demonstrating "rapid growth" of the uterine leiomyomata (defined as a uterus increasing > 6 weeks gestational size within 1 year), the actual incidence was 0%.¹⁶ Therefore, with imaging able to confirm its benign pathology, the management of these lesions should be conservative unless symptom-associated.

Two caveats to the benign history of this lesion. All lesions in this series were single. Several extremely rare conditions occur associated with multiple lesions; one is benign metastasizing leiomyoma (BML), involving ectopic smooth muscle tumor growth in lung, lymph nodes, within veins, which can be recurrent and disseminated within neural tissues, and within the abdomen and retroperitoneum.^{9,17,18} To our knowledge, this ectopic lesion has never been reported to involve a lower urinary site. Recent cytogenetic analysis does show that these BML lesions have shown the same origin as uterine leiomyomata.¹⁹ Two other benign smooth muscle tumors arising from uterine smooth muscle behave aggressively, leiomyomatosis and leiomyomatosis peritonealis disseminata,²⁰ but have not reported to occur primarily in the urinary tract.

The other caveat is in individuals with a cancer predisposition syndrome, such as Cowden's syndrome as reported here (case 1); although the urinary lesion was solitary, these individuals may require additional evaluation to exclude malignancy in other locations. Cowden's syndrome, for example, is a rare autosomal dominant cancer predisposition syndrome associated with a mutation in PTEN gene (tumor suppressor gene). Hamartomas can occur in all three germ layers. While skin papules are the most commonly manifestation, patients so affected are at an increased risk of urothelial cancer, adenocarcinomas of the breast, thyroid, and endometrium, and renal cell carcinoma. Current recommendations are for these patients to undergo annual urinalysis and urine cytology.²¹

The removal of the occasional symptomatic urethral lesion should be carefully planned. While bulky lesions may still be amenable to enucleation, these larger benign lesions may not allow sphincter salvage or preservation of adequate urethral length. A conservative approach of a bulky midline lesion should probably include serial imaging rather than waiting for symptoms to arise thereby potentially complicating the surgical reconstruction.

In our experience, the differentiation of leiomyoma from its malignant counterpart is clear from its presentation, imaging, and cystoscopic appearance. Cystoscopy and MRI allow for accurate preoperative staging. After transurethral resection or transvaginal enucleation we saw no recurrence of this benign lesion. Ultrasound-guided percutaneous biopsy of the mass might occasionally be necessary for determining histology. Leiomyoma are benign non-infiltrative smooth muscle tumors lacking mitotic activity, cytologic atypia, or necrosis.²² Leiomyosarcoma, requiring aggressive treatment, is suggested by extensive central necrosis, invasive growth, and a heterogeneous appearance.³ Both imaging and the cystoscopic appearance of a leiomyosarcoma of the bladder will demonstrate an infiltrative process.

This study is limited by being a single center experience. All lesions were surgically excised so we have limited long term clinical and imaging follow up of smaller or asymptomatic lesions to determine the rate of growth of these lesions.

In our experience, the differentiation of leiomyoma from its malignant counterpart is clear from its presentation, imaging and cystoscopic appearance and demonstrates that these lesions can be managed aided by accurate preoperative staging with cystoscopy and MRI, with successful transurethral resection or transvaginal enucleation occurring without an increased risk of recurrence.⁹

Conclusions

Lower urinary tract leiomyoma are rare, but benign lesions that may be associated with obstructive voiding symptoms due to their size or location. Modern imaging now allows for clear differentiation of this from other benign and malignant lesions of the periurethral soft tissues, resection therefore is required only for relief of symptoms. In comparison to leiomyosarcoma, this lesion presents with slowly progressive symptoms, as a firm but rounded submucosal mass. Its benign ectopic muscle tissue composition is confirmed on imaging, with an absence of mucosal ulceration on cystoscopy. Midline lesions and females are much more likely to present with lower urinary tract symptoms requiring excision. Adoption of a conservative approach for the otherwise asymptomatic and benign appearing lesion appears prudent. Rarely, leiomyoma can be associated with genetically-based cancer predisposition syndromes, such as Cowden's disease. The urologist should be aware of these associated syndromes with leiomyoma in order to both establish a diagnosis and ensure adequate screening for any associated malignancies. □

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