Bladder wall adhesion causing a vesicular septum in a dog following surgical cystotomy

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CASE DESCRIPTION
An 8-year-old spayed female Yorkshire Terrier–Poodle dog was evaluated for persistent pollakiuria and stranguria following routine cystotomy for calcium oxalate cystoliths.

CLINICAL FINDINGS
The dog presented for a cystotomy with intermittent hematuria. Postoperative radiographs revealed no remaining cystoliths. Urine, cystolith, and bladder mucosal aerobic cultures were negative. Pollakiuria, stranguria, and hematuria developed immediately after surgery and persisted despite antibiotics. Ultrasound revealed suspected fibrous adhesions within the urinary bladder lumen connecting the dorsal and ventral bladder wall creating a septum. This was confirmed cystoscopically 4 weeks after surgery.

TREATMENT AND OUTCOME
Cystoscopic-guided laser ablation was performed to incise abnormal tissue connecting the ventral and dorsal bladder wall using a holmium:yttrium-aluminum-garnet laser. Three weeks later, ultrasound revealed adhesion resolution though mild pollakiuria and stranguria persisted. Oxybutynin was prescribed and clinical signs resolved. At 27 months after ablation, hematuria occurred with recurrent cystoliths. These cystoliths were removed by percutaneous cystolithotomy, documenting a cystoscopically normal bladder wall. The patient had normal urination for 55.5 months after ablation, with normal bladder wall thickness on ultrasound repeated at 27 and 36 months after ablation.

CLINICAL RELEVANCE
To the authors’ knowledge, an adhesion creating a septum between the dorsal and ventral bladder wall has not been previously reported as a complication after cystotomy in any species and should be considered as a cause of persistent lower urinary signs after surgery. Ultrasound identified the lesion in this dog. Because bladder abnormalities can develop quickly after surgery, ultrasound might be considered if urine testing is not supportive of infection. Cystoscopic-guided laser ablation was a successful minimally invasive treatment in this case.
decreased definition and mineralization in the renal pelves were observed. The owner elected to pursue a second opinion at a specialty center.

One month later, the dog presented to the Surgery Service of the Animal Medical Center for a cystotomy to remove the identified cystoliths. No medications were being administered at this time. Physical examination showed moderate dental disease but was otherwise normal. Repeat radiographic imaging prior to cystotomy showed 2 radiopaque cystoliths (Figure 1). The patient was prepared for a routine surgical cystotomy, receiving a single perioperative dose of ceftazolin (22 mg/kg, IV). The dog was anesthetized and positioned in dorsal recumbency. The ventral abdomen was clipped of fur and aseptically prepared. A routine cystotomy was performed starting with a ventral midline abdominal incision 3 cm caudal to the umbilicus to 2 cm cranial to the umbilicus. The bladder appeared grossly normal. Stay sutures were placed in the bladder apex using 4-0 polydioxanone. A 2-cm cystotomy incision was made along the ventral bladder midline. Two green-yellow, round, jagged cystoliths were removed from the bladder neck. A cystolith, urine, and piece of bladder mucosa were collected for aerobic culture and sensitivity, and a stone was submitted for quantitative and qualitative analysis. The cystotomy incision was closed using 4-0 polydioxanone in a single layer appositional, full thickness, simple interrupted suture pattern. The incision was leakage tested prior to routine abdominal closure in 3 layers.

The patient recovered uneventfully. No cystic or urethral stones were observed on postoperative radiographs. Stone analysis reported 100% calcium oxalate dihydrate. Culture and sensitivity testing of the cystolith, urine, and piece of bladder mucosa did not show growth. After surgery, the dog received oxymophine (0.1 mg/kg, IV, q 6 h), ceftazolin (22 mg/kg, IV, q 8 h), carprofen (2.2 mg/kg, PO, q 12 h), codeine (1 mg/kg, PO, q 8 h), and amoxicillin–clavulanate potassium (14 mg/kg, PO, q 12 h) over night. The dog was maintained on IV plasmalyte (60 mL/kg/d).

The dog was discharged the following day with codeine (1.25 mg/kg, PO, q 8 h, as needed) and meloxicam (0.1 mg/kg, PO, q 24 h) for 3 to 5 days, as needed. Exercise restriction, diet modification (Urinary SO; Royal Canin), and potassium citrate were recommended. Two days following discharge, the dog appeared painful at home, so codeine was prescribed for 3 additional days.

Twelve days after cystotomy, the patient was re-evaluated for persistent pollakiuria, stranguria, and inappropriate urination that started immediately after discharge. Otherwise, the dog was doing well at home with normal energy and appetite. On physical examination, the incision was clean, dry, and well apposed. Due to suspicion of an underlying urinary tract infection or cystitis, a 10-day course of amoxicillin–clavulanate potassium (15 mg/kg, PO, q 12 h) was initiated.

Three weeks after the cystotomy, the dog was evaluated by the Internal Medicine Service for continued pollakiuria and stranguria, as well as urinary accidents, that did not improve with antimicrobial treatment. The dog’s energy and appetite remained normal. On physical examination, the abdomen was mildly tense. Urinalysis of a sample collected by cystocentesis showed minimally concentrated urine (specific gravity, 1.020), a pH of 6.0, trace blood, no bacteria, no pyuria, and no crystals, and urine culture showed no growth. Focused urinary tract ultrasound revealed thin soft tissue strands within the urinary bladder connecting the dorsal and ventral mucosal wall (Figure 2). The ventral wall of the body of the urinary bladder was thickened (0.57 cm in thickness and 2.3 cm in length) with multiple, hyperechoic foci representing suture material from the previous cystotomy. The corresponding dorsal urinary bladder wall was also mildly thickened at this level.

![Figure 1](image1.png)

**Figure 1**—Right lateral abdominal radiographic view of an 8-year old spayed female mixed-breed dog immediately prior to cystotomy, confirming the presence of 2 radiopaque cystoliths.

![Figure 2](image2.png)

**Figure 2**—Abdominal ultrasound images of the urinary bladder documenting the bladder wall septum. A—The adhesion (thick white arrow) is thickest in the parasagittal plane and spans from the dorsal and ventral surface of the bladder associated with the cystotomy site. B—Transverse view of the adhesion in the urinary bladder showing the septum (thick white arrow) clearly demarcating 2 sides to the bladder. C—An additional view of the adhesion showing the broad-based attachments with the ventral and dorsal surface of the urinary bladder. Notice the hyperechoic suture material (thin white arrows) in the ventral bladder wall, not crossing into the bladder lumen.
with no evidence of hyperechoic suture material. The urinary bladder was otherwise filled with a mild amount of anechoic fluid. Therefore, it was suspected that the patient’s clinical signs were caused by adhesions within the bladder lumen associated with cystitis creating a septum. The patient was referred to the Interventional Radiology Service at the Animal Medical Center for consideration of minimally invasive treatment.

One week later, the dog presented to the Interventional Radiology Service for further evaluation. A repeat focused urinary tract ultrasound showed an unchanged adhesion thickest in the parasagittal plane (just under 2 cm in length), connecting the ventral and dorsal aspects of the urinary bladder wall associated with the cystotomy site (Figure 2). This hyperechoic tissue was to the right of midline at the body of the urinary bladder. The ventral wall remained thickened with 3 repeating hyperechoic foci that likely represented suture associated with the cystotomy. Persistent chronic kidney disease with renoliths was also observed on ultrasound. Due to persistence of the tissue spanning the urinary bladder, a cystoscopy and laser ablation of the adhesion were elected.

A routine cystourethroscopy was performed in dorsal recumbency using a 1.9-mm 30° integrated rigid cystoscope (Karl Storz Endoscopy). The soft tissue band was similar in pigmentation and texture to the surrounding bladder mucosa. This tissue was observed just off midline connecting the dorsal and ventral bladder wall mucosa (Figure 3). The band was ablated midlevel using a 400-μm laser fiber with a holmium:yttrium-aluminum-garnet laser (Odyssey 30; Convergent Laser Technologies) at 12 W (12 Hz and 1 J). A biopsy was not obtained to avoid bleeding and recurrence of adhesions. A persistent hymen was also encountered and laser ablated.

The patient recovered from anesthesia uneventfully and was discharged the same day from the hospital with amoxicillin-clavulanate potassium (21.2 mg/kg, PO, q 12 h) and prednisone (0.5 mg/kg, PO, q 24 h) for 3 days and prazosin (0.85 mg/kg, PO, q 12 h) for 5 days. Diet modification was also advised. A recheck visit was recommended 3 to 4 weeks after laser ablation for a repeat bladder ultrasound, urinalysis, and urine culture. Routine follow-up cystolith screening was recommended every 3 months.

Three weeks after the laser ablation, the dog was reassessed, and it was noted that the pollakiuria, stranguria, and occasional accidents continued, although improved. The hematuria had resolved. The owner reported that the dog was occasionally incontinent when resting and minimally incontinent when walking with a full bladder. A repeat focused urinary ultrasound showed that the previously described adhesion connecting the ventral and dorsal urinary bladder wall was no longer present, but there was a persistent focus of thickened tissue (3 cm in length and 0.7 cm in thickness) at the ventral bladder wall that was heterogeneous with an irregular mucosal margin and small hyperechoic sutures (Figure 4) still visible. This was considered to be a reaction to the sutures
used during the cystotomy. Urinalysis and urine culture and sensitivity were submitted for urine collected by cystocentesis, and aside from a low urine specific gravity at 1.019, there were no abnormalities or any growth on urine culture. Due to persistent lower urinary tract signs, the patient was started on immediate-release oxybutynin (0.2 mg/kg, PO, q 12 h). Within a week, the lower urinary signs resolved and the dog continued to urinate normally. Routine monitoring was recommended every 3 to 6 months, although this was not pursued by the owner.

At 19 months after laser ablation, the dog was seen by a primary care veterinarian for a wellness visit, and no urinary problems were noted. At 27 months after laser ablation, the dog was evaluated by the primary care veterinarian for hematuria with palpable bladder stones. Urine culture and sensitivity on a sample collected by cystocentesis grew *E. coli*. Urinalysis showed moderate hematuria (> 50 RBCs/hpf), calcium oxalate dihydrate crystals (4 to 10/hpf), mild proteinuria (1+), pH of 6, mild pyuria (2 to 3 WBCs/hpf), squamous epithelia (2 to 3/hpf), and a urine specific gravity of 1.027. Abdominal ultrasound revealed urinary cystoliths, with the largest being 3.4 mm in size. The bladder was normal in shape and wall thickness. Additionally, the liver was subjectively large, with a 4.3 x 2.8 x 4.8-cm complex and solid mass suspected to be at the right medial lobe. The ultrasound images were not available upon request from the referring veterinarian.

Due to the cystolith recurrence at 27 months after laser ablation, elevated liver values on serum biochemical analysis (aspartate aminotransferase, 86 U/L; alanine aminotransferase, 292 U/L; alkaline phosphatase, 259 IU/L; γ-glutamyltransferase, 304 IU/L), and a liver mass, the patient was referred to the Interventional Radiology Service at the Animal Medical Center for a concurrent minimally invasive bladder stone removal and liver lobectomy. A ventral midline celiotomy was performed. The contents of the abdominal cavity were grossly normal except for a large, approximately 4-to 5-cm left lateral liver tumor. Multiple nodules were present diffusely throughout the liver, with the largest being approximately 0.8 cm in size.

A routine keyhole cystolithotomy, as described elsewhere,1 was performed using a 2.7-mm 30° integrated rigid cystoscope (Karl Storz Endoscopy) through a 6-mm screw trocar. Multiple stones were visualized, with no other abnormalities noted throughout the bladder wall. All stones were removed, and a small piece of bladder mucosa was submitted for aerobic culture. The endoscope was passed in a nor- mgrade direction down the urethra with no abnormalities noted. The bladder access point was closed with 3-0 poliglecaprone 25 suture using 2 cruciate sutures and then was leakage tested. Next, a left lateral liver lobectomy was performed followed by a punch biopsy of an abnormal nodule on the caudate liver lobe. The abdomen was then flushed and closed routinely in 4 layers. The patient recovered uneventfully.

Stone analysis reported 80% calcium oxalate dihydrate and 20% calcium oxalate monohydrate. No growth was observed on urine and stone culture. Histopathology of the left and caudate liver lobes showed multifocal nodular hyperplasia with hepato-cellular hydropic vacuolar change. The dog was discharged with codeine (2.12 mg/kg, PO, q 8 h, as needed) for 5 days, enrofloxacin (12.9 mg/kg, PO, q 24 h) for 14 days pending stone culture results, maropitant (2.27 mg/kg, PO, q 24 h), ursodiol (17.7 mg/kg, PO, q 24 h), and potassium citrate (76.5 mg/kg, PO, q 12 h). The stone culture was negative. The lower urinary signs resolved after the stones were removed.

At 36 months after laser ablation, the dog underwent abdominal ultrasound by its primary veterinarian to assess the liver, kidneys, and gastrointestinal tract. The bladder wall thickness and shape were normal with no bladder masses or cystoliths observed on ultrasound. The ultrasound images were not available for review. At 54.5 months after laser ablation, the patient was evaluated on an emergency basis for food bloat at another referral center. Abdominal radiographs showed a normal urinary bladder radiographically and no visual radiopaque stones. At 55.5 months after laser ablation, the patient continued to do well clinically and was free of urinary clinical signs. Therefore, with the exception of the transient hematuria associated with the cystoliths that resolved with a cystolithotomy at 27 months after ablation, the patient was otherwise free of urinary clinical signs in the 55-month period following laser ablation.

**Discussion**

To the author’s knowledge, this was the first reported case in any species of a urinary bladder wall adhesion after cystotomy that was spanning the dorsal and ventral surface resulting in a vesicular septum. While minimally invasive urogenital procedures are often considered the gold standard of treatment in human medicine, veterinary medicine is progressively following suit, although a traditional cystotomy continues to be the most common surgery performed in veterinary medicine for the removal of bladder stones. Although minimally invasive techniques for urolithiasis offer shorter anesthesia times, faster recovery times, improved visualization, and possibly lower residual stone fragments and stone recurrence, the cost, training, equipment, and need for referral can be more challenging in veterinary medicine.1-3

In dogs and cats, complication rates associated with a cystotomy have been reported to be between 4% and 46%.2,4-6 Of note, in the study6 with a complication rate of 4%, the rate of incomplete removal of uroliths among dogs that received appropriate imaging after cystotomy was 42% and was not included in the 4% cystotomy complication rate. Of the complications during hospitalization, a far majority are minor complications, including hematuria, urinary incontinence, stranguria, and incomplete stone removal or recurrence, while approximately 3% were considered major complications, including uroabdomen and infection.6 A 2016 retrospective study7 of 31 dogs that underwent a cystotomy with full thickness suture placement
in the urinary bladder identified 4 dogs (12.9%) that had mucosal lesions consistent with a polypoid mass or masses and no cystoliths on ultrasound an average of 28 months after cystotomy. These mucosal changes were generalized and not solely at the location of the sutures. Also, these patients did not have urinary clinical signs, and urine cultures were not submitted at the time of ultrasound. In a prior study of dogs, ultrasound was also able to detect persistent bladder wall thickness at cystotomy sites which peaked 1 day after surgery, and declined linearly over the following 12 weeks. The degree of thickness was associated with detectable sutures on ultrasound. However, presence of suture and degree of cystotomy site thickening were not associated with clinical signs, although the sample size of dogs with clinical signs was small (3/12 dogs). Further, following a ventral cystotomy closure with 3-0 polydioxanone in postmortem evaluation of 20 dogs, omental adherence to the urinary bladder incision was found in 9 of 20 dogs. Lower urinary tract signs have been reported secondary to polypoid cystitis in dogs and in humans, but this is often a result of chronic wall irritation, likely secondary to the stones themselves, and not the specific surgery.

In human medicine, endoscopic transurethral disintegration using mechanical cystolithotripsy, electrohydraulic lithotripsy, and laser is widely performed as minimally invasive procedures for adult cystolithiasis. In children, percutaneous cystolithotomy (PCCL) is a common treatment of bladder stones, especially for larger stone burdens. While large or hard cystoliths were previously an indication for open surgery, holmium:yttrium-aluminum-garnet laser and pneumatic lithotripsy have been shown to be effective and safe treatment methods, replacing the need for traditional cystotomy. Few indications remain for open cystolithotomy and include failure of an endoscopic approach and abnormal anatomy precluding safe entry with endoscopy.

There are no previous reports of postcystotomy intraluminal bladder adhesions in humans, to the authors’ knowledge. Although a degree of subclinical bladder wall thickness has been observed in dogs postoperatively, significant bladder luminal adhesions after cystotomy have also not been described in dogs, and the cause is unknown in our patient. However, the presence of adhesions from the ventral to dorsal wall does imply that there may have been urothelial damage on both walls. An atypical inflammatory response, possibly related to surgical manipulation or preexisting urothelial damage, was deemed the most likely cause of the subsequent fibrous band based on the appearance, location, and timing of the lesion after surgery. While the ventral bladder wall is intentionally incised and closed during surgery, the dorsal wall could have been damaged during the initial surgery or could have been preexisting from the presence of cystoliths or infection. There was no visible suture in the band during laser ablation. However, there were hyperechoic linear bands seen on ultrasound, suggesting suture material was at that level in the ventral bladder wall, but not within the band. This makes suture material crossing the lumen and incorporating the dorsal bladder wall a very unlikely scenario. Bladder wall fibrosis that occurred in this case likely altered urodynamics, bladder compliance, and contractility, contributing to the lower urinary signs after surgery.

Factors associated with surgical technique and materials such as tissue handling, suture pattern, or suture reaction cannot be ruled out as factors contributing to exuberant inflammation and the tissue adhesion. The cystotomy was performed by a team comprised of an experienced board-certified surgeon and a surgical resident in training using commonly accepted bladder closure techniques and materials. Suture contamination, tissue ischemia, tissue and vascular injury, and suture size have previously been implicated with the inflammatory response and adhesion induction in laboratory animals. Therefore, it is possible that factors such as suture diameter, suture tension, pressure of tissue handling, excess foreign material, and excess tissue trauma contributed to the intraluminal bladder adhesion in the current patient. The number of cystotomies performed by this surgical service per year using the same technique, and this being the only known case where this complication was documented to occur, make the technique employed unlikely the cause. A reaction to suture material (polydioxanone) may be even less likely. Given that this is the only report of this complication in human or veterinary medicine and that polydioxanone is a commonly used suture in bladder surgery, it seems an unlikely explanation. Further, in the patient of this report, polydioxanone had been used in previous orthopedic surgeries for joint and muscle fascia closure with no concern. It is also currently unknown whether a more minimally invasive procedure would have avoided this complication.

The ideal suture material for bladder closure is a monofilament that is absorbable and induces minimal tissue reaction while maintaining a watertight seal against urine leakage. In the face of various urine pH levels and a possible bacterial infection, the strength should be maintained, since infection delays healing, promotes fibrosis, and can lead to suture breakdown and a uroabdomen. The bladder wall returns to full strength 14 to 21 days after surgery with complete reepithelialization in 30 days, so the ideal suture maintains strength during this period and then undergoes total resorption when the bladder is adequately healed. Urine pH, infection, medications, patient health, and surgical technique can affect the rate of suture degradation.

Having suture material present in the bladder lumen for many months of a recurrent stone-forming dog is ultimately contraindicated. Stones can form on these intraluminal sutures and expedite stone recurrence. Thus, shorter-acting suture and avoiding the lumen are ideal. Though it is traditionally not recommended to close a urinary bladder with full thickness sutures, and again one should avoid intraluminal suture material, most operators find it difficult to completely avoid the mucosa in a healthy urinary bladder while ensuring to incorporate the holding layer, the submucosa, without the mucosa. In the authors’ expe-
rience, numerous cystoscopy procedures performed months after urinary bladder surgery will inevitably find suture material within the urinary bladder lumen, despite a surgery report suggesting full thickness suturing did not occur. It is unlikely that the complication of interest impacting the ventral and dorsal wall of the bladder is caused by closure technique, since the suture was only seen at the ventral bladder wall, rather than within the bladder lumen, and the cystotomy was only performed on the ventral wall. However, further investigation is warranted into the prevalence of intraluminal adhesions following routine cystotomy and the potential for a suture reaction if there was some intraluminal penetration.

Proliferative intravesicular tissue has also been identified in veterinary and human medicine with no history of prior cystotomy. In a case series of 4 cats presenting with acute urinary outflow obstruction due to pseudomembranous cystitis, ultrasound documented numerous intravesicular hyperechoic strips resembling membranes. Since conventional therapy had failed to reestablish normal urinary function, 3 of 4 cats underwent a cystotomy to remove the intravesicular tissue. All treated cats recovered and remained healthy. In a 2017 case report of a 33-month-old female spayed domestic shorthair cat, a membrane-like structure was found within the urinary bladder neck and was associated with urinary incontinence and stranguria. A congenital cause was suspected given the lack of surgical or traumatic history and the singular smooth lesion. Although a stricture recurred after 5 sessions of fluoroscopic-guided balloon dilatation of the bladder neck, clinical signs were reported to have resolved 5 months following self-expanding metallic stent placement. Several causes of pseudomembranous cystitis have been reported in humans, including infection, urine drugs metabolites such as cyclophosphamide, and overdistension of the urinary bladder. These examples emphasize that, for the patient of the current report, it is possible that extensive urothelial damage without suture-related factors could have caused, or contributed to, this membrane formation within the bladder.

The treatment of this bladder wall adhesion was accomplished by using a minimally invasive approach through cystoscopic-guided laser ablation. In the authors’ practice, this is a commonly utilized technique for the treatment of other lower urinary tract lesions like intramural ectopic ureters, bladder polyps resection, ablation of bleeding lesions within the urinary bladder/urethra, and ablation of a persistent paramesonephric remnant.

In a recent study, lower urinary signs including pollakiuria and stranguria were reported in 11% (2/18) of dogs 2 weeks after cystotomy and 16.7% (3/18) of dogs 6 weeks after cystotomy. At 12 weeks after cystotomy, no dogs had persistent urinary tract signs noted. In addition to the complication described in this report, causes of new or persistent lower urinary tract signs after a cystotomy could include incomplete stone removal, the presence of a bladder/urethral hematoma, acquisition of a urinary tract infection, cystitis, concurrent neoplasia, or iatrogenic trauma. More specifically, radiographically detectable stones have been reported in 14% to 20% of dogs after cystotomy, compared with rates as low as 3.7% in animals undergoing an image-guided technique like a PCCL. These studies highlight a potential advantage of improved visibility with the PCCL technique.

Following cystotomy, this patient received empirical antibiotic therapy for persistent lower urinary tract signs, while reports on postcystotomy urinary tract infection rates in dogs are limited. It is considered uncommon for a dog to develop a urinary tract infection after surgery, especially when they are routinely evaluated for infection either immediately preoperatively or intraoperatively with stone, urine, and/or bladder wall cultures. In 1 study, 48% of dogs during a cystotomy had positive results of bladder, urine, and/or stone samples. In contrast, it is reported that 14% to 20% of patients have evidence of radiographically detectable residual stones after cystotomy. Given the higher prevalence of infection, compared with the prevalence in residual stones, it is recommended that all dogs undergoing a cystotomy have a urine culture performed prior to their procedure, and if there is an urgency to the procedure, then it should be done intraoperatively to ensure appropriate medical management is employed postoperatively. Additionally, it is important to acknowledge that a majority of the canine positive culture cases are associated with struvite stones and a urease-producing organism, which can be routinely dissolved medically and should not require surgical intervention. Based on antimicrobial stewardship guidelines, urinalysis and urine culture should be performed prior to the use of empiric antibiotics, and therefore empirical antibiotic therapy should not be recommended for persistent lower urinary tract signs without evidence for its use. If urine testing is not suggestive of an infection, then imaging such as abdominal radiographs and ultrasound should be performed to investigate for less common complications, including tissue adhesions. This diagnosis would not have been possible with routine abdominal radiographs, so an ultrasound was required.

Following a cystotomy, the patient was prescribed immediate-release oxybutynin due to persistent lower urinary tract symptoms. Clinical use of oxybutynin in animals is often based on previously reported human pharmacokinetics since studies are limited in animals. In humans, immediate-release oxybutynin has been used to manage urge urinary incontinence and is typically effective within 3 days of treatment in patients with overactive bladder and associated with significant improvement, of 76.5% reduction, in incontinence episodes after 3 weeks of administration in patients with overactive bladder. Based on pharmacokinetics in humans, the immediate-release oxybutynin is administered 2 to 3 times/d for overactive bladder. Thus, 4 weeks of treatment with oxybutynin was considered, and it was recommended that the patient return for a recheck in 2 weeks to see if there was improvement. However, the patient did not return at that time.

Due to the retrospective nature of this clinical report and reliance on owner reports and follow-up, our
findings do have some limitations. Recommended follow-up diagnostic tests, like serial abdominal imaging to manage the recurrent stone disease and follow the lesion longer term, were not pursued by the owner as frequently as recommended. In addition, laser ablation of this lesion was successful in this patient, but a single case report cannot predict another patient would have a similar successful outcome.

Further investigation into bladder wall changes following routine cystotomy versus more minimally invasive techniques, like PCCL, should be considered to further define the incidence of this finding. In addition, comparing bladder wall reactions with different suture types would be another future consideration.

In conclusion, proliferation, or a tissue reaction, after cystotomy causing bladder wall luminal adhesions and a vesiculoprosthetic cystectomy should be considered in the differential diagnosis of a patient with persistent pollakiuria and stranguria after a cystotomy. This is particularly true when radiographs immediately postoperatively are negative for lower urinary tract residual uroliths, urine testing is negative for infection, and signs are unresponsive to standard therapy.

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