Dysuria caused by a partially obstructing urethral membrane in a female dog

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Case Description—A 3.5-year-old spayed female Labrador Retriever was examined for dysuria of unknown duration.

Clinical Findings—Urogenital examination revealed a recessed vulva and a persistent hymen. The hymen was broken down digitally. Results of urinalysis at the referral examination were unremarkable, and no clinically relevant abnormalities were detected on clinicopathologic analysis of blood and serum samples or cytologic evaluation of a vaginal smear. After clinical signs persisted, retrograde contrast vaginourethrocystography was performed; results were considered normal. During urethroscope examination, a translucent membranous structure was detected that partially obstructed the urethral lumen near the junction of the urethra and bladder.

Treatment and Outcome—Passage of the endoscope into the urinary bladder ruptured the membranous structure. The dog recovered from the procedure uneventfully and was treated with colchicine (0.03 mg/kg [0.014 mg/lb], PO, q 24 h for 14 days). One month later, the owner reported resolution of clinical signs. Fourteen months later, the patient was evaluated for recurrence of dysuria of several months’ duration. Urethroscope examination revealed a membranous structure similar to that originally detected; this tissue was also ruptured during endoscopy. The patient was discharged and the owner was instructed to administer colchicine at the same dosage. Recurrence of dysuria was reported again 10 months following the second procedure.

Clinical Relevance—To the authors’ knowledge, this type of membranous urethral obstruction has not been previously described in a dog. Administration of colchicine did not prevent recurrence, but potential effects of drug administration on time to recurrence could not be evaluated. (J Am Vet Med Assoc 2011;239:818–822)

A 3.5-year-old 35-kg (77-lb) spayed female Labrador Retriever was examined at the UFSAH for evaluation of dysuria of unknown duration. The owners reported that abnormalities in the dog’s urination pattern had been evident for at least several months; they described progressive clinical signs of prolonged posturing during micturition, pollakiuria, and stranguria. Although they had owned the dog since it was < 6 months old, the owners could not report with confidence whether she had ever urinated normally. The dog had completed 1 estrous cycle before undergoing ovariohysterectomy at approximately 1 year of age; no complications had been associated with the surgery.

Two months prior to referral to the UFSAH, the dog was evaluated by the referring veterinarian because of pollakiuria and stranguria. Analysis of a midstream free-catch urine sample revealed a USG of 1.050 and pH of 8.0, without proteinuria. Numerous struvite crystals and amorphous granular crystals were seen on microscopic examination of the urine sediment. Small numbers of WBCs (1 to 3/hpf), squamous epithelial cells (3 to 4/hpf), and transitional epithelial cells (3 to 4/hpf) and a moderate amount of coccosoid bacteria were also present, without detectable RBCs. Ciprofloxacin (10.7 mg/kg [4.86 mg/lb], PO, q 12 h) was administered for 14 days, but no improvement in clinical signs was detected. Three weeks later (5 weeks prior to initial presentation to the UFSAH), the patient was evaluated by the referring veterinarian for progression of the described clinical signs. Results of analysis of a urine sample obtained via cystocentesis were within normal limits, with USG of 1.023, pH of 6.0, and no evidence of crystals or bacteria detected. Five days later, results of a physical examination were unremarkable, and the owner reported that the dog appeared to begin micturition normally, but the urine stream became progressively weaker and posturing was prolonged. A urine sample was collected via cystocentesis for analysis and culture. Results were similar to those of the second urinalysis, except that USG was 1.015 and urine pH had returned to 8.0. Aerobic bacterial culture of this sample resulted in no growth after 48 hours. Results of abdominal radiography were reported to be within normal limits by the referring veterinarian. The dog had previously been fed different adult maintenance diets, but an acidifying diet was prescribed at the time of this evaluation. The dog was not receiving medications other than orally administered heartworm prophylaxis and

Abbreviations

UFSAH University of Florida Small Animal Hospital
USG Urine specific gravity

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a topically administered spot-on imidacloprid and permethrin product. The dog was referred to the UFSAH for further evaluation.

At the UFSAH, results of physical examination were unremarkable except for vulvar conformation. The vulva was recessed and the dorsal and lateral perivulvar skin folds obscured the vulvar opening. The dog was observed during micturition, and signs of dysuria were similar to those described by the referring veterinarian. No abnormalities were detected via digital rectal palpation.

Clinicopathologic evaluation included examination of results of a CBC, serum biochemical analysis, urinalysis, aerobic bacterial culture of urine, vaginal examination, cytologic evaluation of a vaginal smear, and abdominal ultrasonography. Results of the CBC were within normal limits except for mild neutrophilia (12.3 × 10³ neutrophils/µL; reference range, 3.0 to 11.5 neutrophils/µL) and mild monocytosis (1.6 × 10³ monocytes/µL; reference range, 0.15 to 1.4 monocytes/µL) with a few reactive monocytes and 1 to 2 echinocytes/hpf. Results of serum biochemical analysis were within laboratory reference ranges, except for a mildly high alanine aminotransferase activity (90 U/L; reference range, 16 to 77 U/L). A urine sample was collected via cystocentesis, and results of urinalysis were within normal limits: USG was 1.019, pH was 7.0, and aerobic bacterial culture yielded no growth. Digital examination of the vagina revealed a nearly complete hymen at the level of the cingulum. Visual examination via vaginoscopy, although limited, revealed discolored, friable tissue and debris within the vagina. Cytologic evaluation of a sample obtained by use of a vaginal swab revealed mostly parabasal cells, broken cells, a few neutrophils, and mucus without evidence of inflammation. The persistent hymen was broken down digitally. Results of abdominal ultrasonography were unremarkable. Because of financial constraints, the dog was discharged from the hospital, and the owner was instructed to monitor its condition.

Approximately 6 weeks later, the dog was reevaluated at the UFSAH for persistence of the previously described clinical signs. No changes from the previous physical examination were evident. Survey radiography of the caudal abdomen and perineal region revealed no abnormalities. Additional diagnostic evaluation included retrograde contrast vaginourethrocystography and uroendoscopic examination performed under general anesthesia. The patient was placed in left lateral recumbency, and a 14F balloon-tip catheter was inserted into the vestibule. Two Babcock forceps were placed on the vulvar lips, and the catheter balloon was inflated. Iodinated contrast medium³ (350 mg of iodine/mL) was diluted with sterile water in a 1:1 ratio and injected through the balloon-tip catheter. Evaluation of the injection was performed with real-time fluoroscopy and revealed a patent urethra with no filling defects, no obstruction to flow, and accumulation of contrast within the urinary bladder. A radiograph obtained at that time revealed similar features (Figure 1). Interpretation of the fluoroscopic and radiographic images indicated that the results of vaginourethrocystography were normal.

Following the contrast study, uroendoscopic examination was performed by use of a 5.0-mm × 1.0-m flexible videoscope. The distal urethra subjectively appeared pale, but no other abnormalities were present. Near the junction of the urethra and urinary bladder, a thin, translucent membrane originating from the dorsal aspect of the urethra was seen (Figure 2). The eccentrically located membrane obscured approximately two-thirds of the urethral lumen. Passage of the endoscope into the urinary bladder resulted in rupture of the membranous structure and an immediate increase in urethral lumen diameter (Figure 3). The urethral mucosa was erythematous and abraded at that site, but only minor bleeding was detected. Examination of the urinary bladder revealed no abnormalities, and both ureteral openings were in the appropriate anatomic locations. The patient recovered uneventfully and was treated with colchicine (0.03 mg/kg [0.014 mg/lb], PO, q 24 h for 14 days). Clinical signs of dysuria were not evident during micturition immediately after recovery from the cystoscopy procedure, and in a follow-up telephone call 1 month later, the owner reported that the dog appeared to be urinating normally.

Approximately 14 months after initial evaluation at the UFSAH, the dog was examined again for recur-

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**Figure 1**—Retrograde contrast vaginourethrocystogram of a 3.5-year-old spayed female Labrador Retriever referred to the UFSAH for evaluation of progressive clinical signs of prolonged posturing during micturition, pollakiuria, and stranguria. Note the unobstructed flow of contrast through the urethra and accumulation of contrast within the urinary bladder. L = Left lateral recumbency.
rence of dysuria of several months’ duration. Results of a physical examination and evaluation of abdominal radiographs were considered normal. Analysis of a urine sample obtained via cystocentesis revealed a USG of 1.017 and pH of 8.5, with no clinically relevant findings on evaluation of the sediment. Although a dipstick test was positive for protein, the sample tested negative via sulfosalicylic acid precipitation. Aerobic bacterial culture yielded no growth. Uroendoscopic examination under general anesthesia revealed a translucent membranous structure (arrows) that partially obstructed the urethral lumen. Subsequent passage of the endoscope into the urinary bladder ruptured the membrane.

Figure 2—Uroendoscopic image obtained during evaluation of the junction of the urethra and urinary bladder in the same dog in Figure 1, revealing a translucent membranous structure (arrows) that partially obstructed the urethral lumen. Subsequent passage of the endoscope into the urinary bladder ruptured the membrane.

Figure 3—Uroendoscopic image of the same anatomic region of the dog in Figure 2. This image was obtained after the partially obstructive membrane was ruptured via passage of the endoscope.

Discussion

Urethral anomalies can be congenital or acquired. Most of these conditions can be diagnosed by use of various techniques, including contrast cystouretrography (voiding or retrograde), uroendoscopic examination, and cytologic or histopathologic analysis of smears or biopsy samples. In the dog of this clinical report, results of retrograde vaginourethrocystography were considered normal; however, uroendoscopic examination identified a partial urethral obstruction. The discrepancy in results between imaging techniques could be explained if the lesion acted as a 1-way valve that allowed retrograde but not normograde flow. Voiding urography was not performed but may have been useful in identifying this type of a lesion and should also be considered a useful diagnostic tool for evaluation of the urogenital tract. Limited detection of such a lesion, associated with contrast filling the urethral lumen cranial and caudal to the obstruction, could occur because of its membranous structure. This emphasizes the importance of endoscopy as a diagnostic tool for evaluation of the lower urinary tract even when abnormalities are not detected via contrast radiography.

Congenital defects of the canine urethra are uncommon. Urethral anomalies such as agenesis, duplication, stricture, and ectopia are reported to affect males more frequently than females.1,2 In this clinical report, progressive dysuria was described in an adult female dog, and a congenital abnormality was considered less likely but still possible because it was not known whether the dog’s micturition abnormalities had developed over time or had always been present.

Congenital urinary anomalies occur more commonly in humans than in veterinary patients.3 In the human medical literature, a congenital obstructive posterior urethral membrane has been described4; however, in humans, this membrane (hypothesized to be of embryologic origin) consists of an attachment of the verumontanum, a prominence of the male urethra, to the anterior wall of the posterior urethra, and a similar structure would not be expected to occur in a female dog.

Vestibulovaginal stenosis is a congenital defect in dogs that does not directly involve the urethra but has been suggested as a cause of clinical signs associated with lower urinary tract disease, such as increased frequency of urination.5,6 Vestibulovaginal stenosis can be associated with a persistent hymen or a cingular septum and occurs at the level of the vestibulovaginal junction,5,6 distal to the location of the urethral lesion described in the dog of the present report. The dog of this report had a persistent hymen that was initially considered a potential cause of, or a contributing factor to, the described clinical signs. However, clinical signs did not subside after the persistent hymen was broken down, and this abnormality was unlikely to have contributed to this dog’s clinical signs.

Acquired urethral abnormalities are reported more commonly than are congenital urethral anomalies in dogs. Urethral strictures may be congenital or acquired,
but acquired strictures develop more frequently and are associated with various causes including trauma, inflammatory conditions, urinary calculi, or neoplasia.\(^1\) External or internal traumatic urethral injury may result from various conditions (such as pelvic fracture) or procedures (such as urethral catheterization). Uncommonly, inflammatory conditions with or without urinary calculi can result in stricture formation; neoplastic conditions affecting the urinary tract can also cause urethral luminal narrowing or stricture formation.\(^2\) No history of a potential cause of stricture formation was identified in the dog of this report. Neoplasia was considered unlikely because of the dog’s young age and absence of other detectable lesions in the urethra or urinary bladder. Nonetheless, this stricture may have been acquired, and it is possible that the owners missed clinical signs associated with an inciting event.

Inflammatory conditions can affect the urethra. Granulomatous, bacterial, and, less commonly, fungal urethritis occur in dogs; granulomatous conditions can affect older female dogs, and bacterial infections can develop in association with cystitis.\(^3\) Dogs with urethritis may have clinical signs of dysuria, stranguria, and pollakiuria. No infectious agents were identified during repeated diagnostic evaluations, and urethritis commonly results in diffuse disease rather than an isolated lesion. Additional cytologic and histologic examination would be required to identify the cells present in this obstructive tissue and to confirm that only a localized region was affected.

Unfortunately, tissue from the membrane was not collected for histologic examination at the time of the first uroendoscopic examination. As a result, some information that might have aided diagnosis as well as treatment was not obtained. Samples were not collected from the remainder of the urethra because its gross appearance was subjectively normal and biopsy sample collection could potentially cause mucosal damage. Samples collected from the second uroendoscopic procedure would likely have been affected by the trauma induced during the first procedure and may not have been representative of the original lesion.

Placement of an indwelling urinary catheter following the procedure was considered but thought to be unnecessary given the immediate increase in urethral diameter following membrane rupture. Urine is an irritating substance that can cause inflammation and necrosis of exposed submucosal tissue, and an indwelling urinary catheter may limit submucosal exposure to urine after traumatic mucosal damage. Continued irritation can alter healing and result in fibrosis and subsequent stricture formation.\(^1,7,8\) In human medicine, placement of an indwelling urinary catheter is recommended for 3 days following dilation of urethral strictures.\(^9\) Although stricture dilation was not performed, the urethral mucosa was damaged during passage of the endoscope and rupture of the membrane. The submucosa was then exposed to urine, which increased the risk for subsequent scar tissue formation.\(^1,7,8\) Colchicine was administered in an attempt to prevent potential fibrosis and scar tissue formation. Colchicine is an alkaloid with several anti-inflammatory and antifibrotic effects. By binding to microtubules, colchicine inhibits collagen production and proliferation of fibroblasts or other cells via alterations in mitosis.\(^10–13\) The drug’s anti-inflammatory properties result from its ability to alter chemotaxis and adhesion of inflammatory cells.\(^10,13\) Reduction of inflammation likely plays a role in decreasing fibrosis.\(^10\) Colchicine has been used primarily to treat humans with gout and dogs with hepatic fibrosis and amyloidosis.\(^10,11,13\) More recently, the successful use of colchicine has been reported in a dog with an endotracheal stent and subsequent granulation stenosis\(^14\) as well as in dogs that underwent balloon angioplasty procedures.\(^15\) To the authors’ knowledge, there have been no reports of colchicine administration following dilation of the urethra. The membranous obstruction in this patient was present at reevaluation 14 months following the first procedure, and clinical signs were reported to have returned 10 months after the second procedure. No conclusions can be made regarding whether colchicine may have delayed recurrence of the urethral lesion; however, use of the drug did not prevent recurrence of the lesion.

Because of financial constraints, continued medical treatment or additional interventional procedures were not pursued. At the time of this report, the owners were satisfied with the dog’s clinical condition. Although they reported continued dysuria, they did not believe that the dog had signs of pain or that the clinical signs had a negative impact on the dog’s quality of life. Recommendations for further treatment were made for the eventuality that the dog’s condition worsens. Possible treatment options include intravesical triamcinolone acetamide or mitomycin C injections. Intravesical triamcinolone acetamide has been reported as a successful treatment following endoscopy-assisted balloon dilation of an esophageal stricture in a dog\(^15\) and rectal strictures of nonneoplastic origin in dogs.\(^16\) Topical treatment with mitomycin C has also been used to decrease fibrosis in experimentally induced urethral strictures in rats\(^17\) as well as to decrease the rate of stricture formation associated with esophageal burns in rats.\(^18\) More recently, mitomycin C has been used in the treatment of refractory esophageal strictures in humans.\(^19,20\) Although the use of mitomycin C for other purposes has been reported in dogs, it has not been evaluated for the prevention fibrosis in this species.\(^21,22\) Other described treatments for urethral obstruction include dilation of the narrowed lumen with a self-expanding nitinol stent,\(^23\) use of a rigid cystoscope with a cutting loop to obliterate obstructive tissue from the urethral walls (transurethral resection),\(^24\) and use of a flexible endoscope to ablate the obstruction with a neodymium:yttrium-aluminum-garnet laser.\(^25\)

In future cases involving similar obstructive membranous lesions in dogs, the authors recommend collection of biopsy samples of the lesion and surrounding mucosa for histologic evaluation and culture as part of the diagnostic plan. There are several reported methods of treatment described in the literature that may be effective in treatment of such lesions.

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**References**

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2. California Natural Pet Food, Natura Pet Products Inc, San Jose, Calif.

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