

## What Is Your Diagnosis?

In collaboration with the American College of Veterinary Radiology

# Recurrent lower urinary tract signs in a 4-year-old male castrated domestic longhair cat

**Keywords:** urethral obstruction, urethral foreign body, perineal urethrostomy, feline lower urinary tract disease, stranguria

### History

A 4-year-old 5.7-kg male indoor-outdoor castrated domestic longhair cat presented for treatment of feline lower urinary tract disease (FLUTD). The cat initially presented to the family veterinarian for evaluation of pollakiuria and licking his perineal region. In-house urinalysis from a free-catch urine sample revealed severe hematuria, pyuria, and bacteriuria with cocci. The patient was prescribed cefovecin (8 mg/kg, SC), robenacoxib (1.9 mg/kg, SC, followed by 1 mg/kg, PO, q 24 h for 3 days), gabapentin (5.3 mg/kg, PO, q 12 h). Two days later, the cat represented for dysuria and abdominal pain. On physical examination, the cat was stable with normal vitals. The bladder was firm and painful on abdominal palpation. CBC was unremarkable, serum biochemistry revealed suspected stress hyperglycemia (286 mg/dL; reference range, 70 to 150 mg/dL). Urinary catheter placement under sedation was unsuccessful and the patient was referred to the Washington State University Veterinary Teaching Hospital for further management.

On presentation, the cat was quiet, alert, and responsive. His urinary bladder was firm and painful on palpation, with the remainder of the general physical examination unremarkable. Initial bloodwork revealed hyperkalemia (4.8 mmol/L; reference range, 2.9 to 4.2 mmol/L), and mildly elevated BUN (38 mg/dL; reference range, 15 to 34 mg/dL). The cat was sedated with dexmedetomidine (0.01 mg/kg, IV, once), butorphanol (0.2 mg/kg, IV, once),

ketamine (5.5 mg/kg, IV, once), and propofol (20 mg, IV, once) for urinary catheter placement. A coccygeal block was performed using lidocaine (20 mg, epidural, once). A single lateral radiograph was obtained after attempts at urinary catheter placement (**Figure 1**).




**Figure 1**—Left lateral radiograph of the abdomen of a 4-year-old male castrated domestic longhair cat that was referred for evaluation of dysuria.

**Formulate differential diagnoses, then continue reading.**

### Diagnostic Imaging Findings and Interpretation

A single left lateral radiograph of the abdomen was obtained (**Figure 2**). A urinary catheter is placed in the penile urethra. The catheter passes dorsally through a suspected urethral tear and terminates in the retroperitoneal space at the level of the fifth to sixth lumbar vertebra. There is a superimposed cluster of gas foci dorsal to the urethra just cranial to the pelvic inlet. The urethra is moderately dilated at this level. The urinary bladder is moderately distended. No radiopaque uroliths are present.

The serosal detail in the abdomen and retroperitoneal space is good. The intestines appear as a

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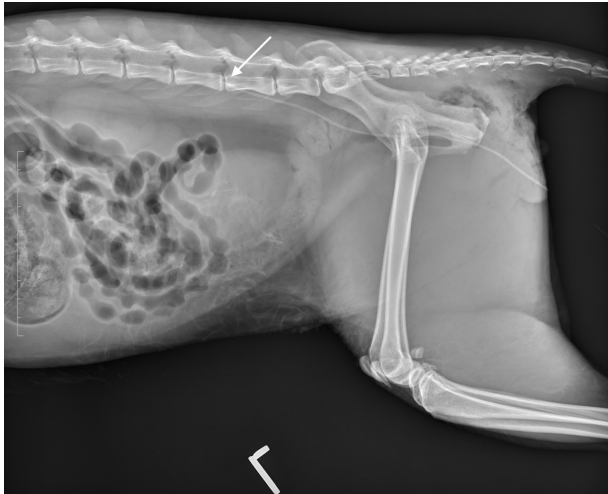
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**Figure 2**—Same lateral radiograph as in Figure 1. A urinary catheter passes through the penile urethra, diverts craniodorsally through a suspected urethral tear, and terminates in the retroperitoneum at the level of L5-6 (arrow). Note the superimposed cluster of gas foci dorsal to the urethra just cranial to the greater trochanter. This could represent an area of inflammation related to the grass awns found in surgery.

string-of-pearls likely related to ileus as no gastrointestinal signs were reported. There is subcutaneous emphysema in the perineal region. There is wet hair coat artifact superimposed with the urinary bladder.

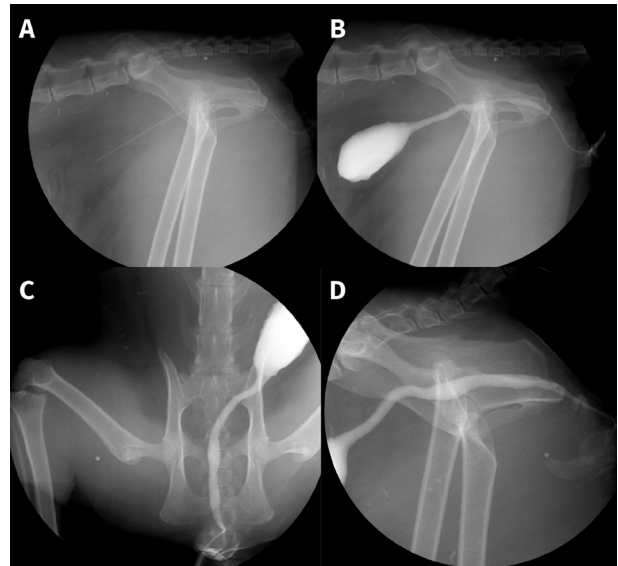
Based on the imaging findings and known previous attempts of urinary catheter placement, an iatrogenic urethral tear was diagnosed.

## Treatment and Outcome

Multiple attempts of retrograde and ultrasound-guided percutaneous normograde catheterization with a weasel guidewire were unsuccessful. The urinary bladder was fully evacuated via cystocentesis. The patient was hospitalized on IV crystalloid fluids (Plasma-Lyte A; Baxter; 15 mL/h, IV) and methadone (0.2 mg/kg, IV, q 6 to 8 hours) and transferred to the surgery service the following morning.

The cat was placed under general anesthesia for surgical placement of a urinary catheter. A urinary catheter (MILA Tomcat/Small Animal Urinary Catheter; MILA International; 2.5 Fr) was passed normograde through the cystotomy incision. A weasel guidewire was then introduced retrograde into the bladder, followed by retrograde placement of a 3.5 Fr Slippery Sam Tomcat catheter over the guidewire. The urinary catheter was secured to the prepuce with simple interrupted sutures. The patient was hospitalized for conservative management of the urethral tear. Intraoperative urine and bladder mucosal culture showed no growth.

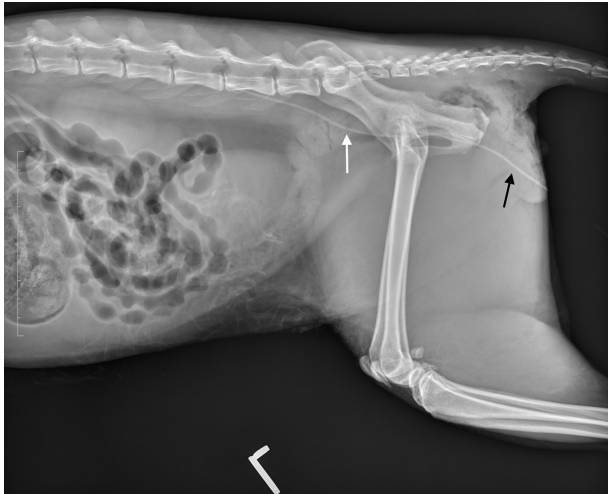
After 10 days of supportive care, a fluoroscopic contrast cystourethrogram was performed under sedation using a total of 12 mL of iodinated contrast (Omnipaque 300 mgI/mL; GE Healthcare) diluted 1:1 with sterile water (**Figure 3**). After confirming catheter patency and location, the bladder was



**Figure 3**—Frames from a fluoroscopic cineloop. A—Plain frame to confirm the urinary catheter location within the bladder. The urinary bladder is mildly distended, and the urinary catheter extends cranially to the trigone. B—Diluted iodinated contrast was administered into the bladder, no leakage is seen and the bladder wall is thickened and irregular. C—A ventrodorsal image to confirm no contrast leakage. D—The urinary catheter is being removed; the tip of the catheter is in the penile urethra. No urethral tear is visible.

distended with contrast. The urethra was visualized during concurrent contrast administration and slow removal of the urinary catheter. A urethral tear was not identified. There were no strictures or uroliths present. The bladder wall was thickened and irregularly marginated, and the urethra dilated with mild urethral wall undulation. A ventrodorsal study was taken to confirm no medio-lateral contrast leakage. Based on the findings, the urinary catheter was removed. The patient urinated independently approximately 50 mL of urine after the fluoroscopic study was completed.

The following day the patient was straining to urinate, suspected due to recurrence of FLUTD. A urinalysis confirmed hematuria, proteinuria, pyuria, with no bacteriuria or crystalluria. Hematology was unremarkable, biochemistry showed stress hyperglycemia (232 mg/dL; reference range, 70 to 140 mg/dL). The cat was taken to surgery for a perineal urethrostomy. A sterile Tomcat catheter was passed into the urinary bladder with some difficulty. During dissection, a region of firm darkened subcutaneous tissue was noted firmly adhered just lateral to the proximal penile urethra. The retractor penis muscle was excised and a longitudinal incision was made to expose the urethral mucosa. At the level of the subcutaneous pathology, an approximately 5 mm by 0.5 mm grass awn foreign body was discovered and removed from the penile urethra (**Figure 4**). The distal urethra was removed and the remaining incision ventral to the new urethral stroma was closed. The patient recovered well and was kept in hospital on IV fluids (Plasma-Lyte A; Baxter, 9 mL/h, IV),



**Figure 4**—Left lateral radiograph pointing out the locations of the urethral tear and the grass awn in the penile urethra. The white arrow shows the possibly iatrogenic urethral tear. The black arrow points at the location where the grass awn was found during surgery.

buprenorphine (0.02 mg/kg, transmucosal, q 8 h), gabapentin (9 mg/kg, PO, q 8 h), amoxicillin and clavulanic acid (12 mg/kg, PO, q 12 h), and prazosin (0.3 mg/cat, PO, q 12 h). The cat was discharged home 48 hours after the surgery. At the time of discharge the patient was urinating consistently a wide stream without straining.

## Comments

FLUTD is common in male cats; urethral obstruction (UO) is mostly seen in young (1 to 7 years old) male castrated indoor cats of increased body weight.<sup>1</sup> Male cats are overrepresented because of the urethral anatomy and their common patient temperament that can contribute to UO.<sup>2</sup> Urethral plugs represent up to 60% of cats with UO; other causes can include urolithiasis, idiopathic UO, stricture secondary to urethral trauma, neoplasia, and foreign body obstruction.<sup>1,3</sup> Urethral rupture in cats is predominantly reported secondary to iatrogenic causes such as traumatic urinary catheterization and trauma such as vehicular trauma or gunshot wounds.<sup>2</sup> There are only 2 reported cases of a grass awn in the penile urethra causing dysuria.<sup>3</sup>

Radiographs are useful in ruling out underlying disease for UO such as cystolithiasis or trauma. In this case, radiography diagnosed the iatrogenic urethral tear, which supported continued conservative treatment as most urethral tears heal by second intention. A urethral catheter is often used for urinary diversion to allow uroepithelium to bridge the defect and allow the urethra to heal.<sup>2</sup>

The radiographs were not sensitive enough to identify the radiolucent foreign plant material. In retrospect, challenges in urinary catheter placement should prompt one to consider UO due to a foreign body; however, due to lack of radiographic evidence of cystolithiasis, absence of crystalluria and presence of bacteriuria, FLUTD was presumed.

A positive contrast urethrocytogram can be helpful to confirm urethral or urinary bladder leakage, strictures, and obstruction due to radiolucent cystoliths. However, contrast urethrography was not sensitive enough to detect the urethral grass awn in this case. Advanced imaging such as CT could also be used, however, CT is often insensitive at detecting plant material.<sup>3,4</sup> In contrast, ultrasound can be used to assess the bladder, preprostatic and penile urethra, as well as structures located caudal to the ischiatic arch. In both the previous case reports and our patient, the plant material was only detected during definitive surgery. However, ultrasound of the penile urethra should be considered during unsuccessful catheterization. Perineal urethrostomy and plant material removal was curative for urinary obstruction in all cases.<sup>3</sup>

Foreign plant material can enter the body either through an orifice or skin.<sup>5</sup> The grass awn likely lodged in the penile urethra after ascending migration from the urethral opening as the shape of grass awns allows unidirectional movement.<sup>4</sup> Cats with outdoor access may be exposed to plant foreign bodies more frequently than indoor only cats with male cats being overrepresented.<sup>3</sup> We postulate that the urethral tear located in the prostatic or preprostatic urethra was iatrogenic and due to excessive force placed during urinary catheterization. It is likely to have been a separate problem from the grass awn foreign body as that was discovered more caudally in the penile urethra.

Foreign plant material should be considered as a differential diagnosis for UO, especially when urethral catheterization is challenging, or if catheterization results in iatrogenic urethral rupture. Urinalysis and culture are nonspecific for detecting urethral foreign material. Radiographs and positive contrast cystourethrograms are equally unlikely to detect presence of foreign material likely due to its small size and soft texture, and therefore careful attention should be paid to intraoperative findings as they can be crucial for its detection. Positive contrast cystourethrogram might not distend the urethra adequately, especially the distal penile urethra. Inadequate technique can also contribute to a negative study. Urethra distal to the ischiatic arch can be evaluated as part of an abdominal ultrasound in patients with lower urinary tract signs, especially in cases where catheterization is difficult or impossible.

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