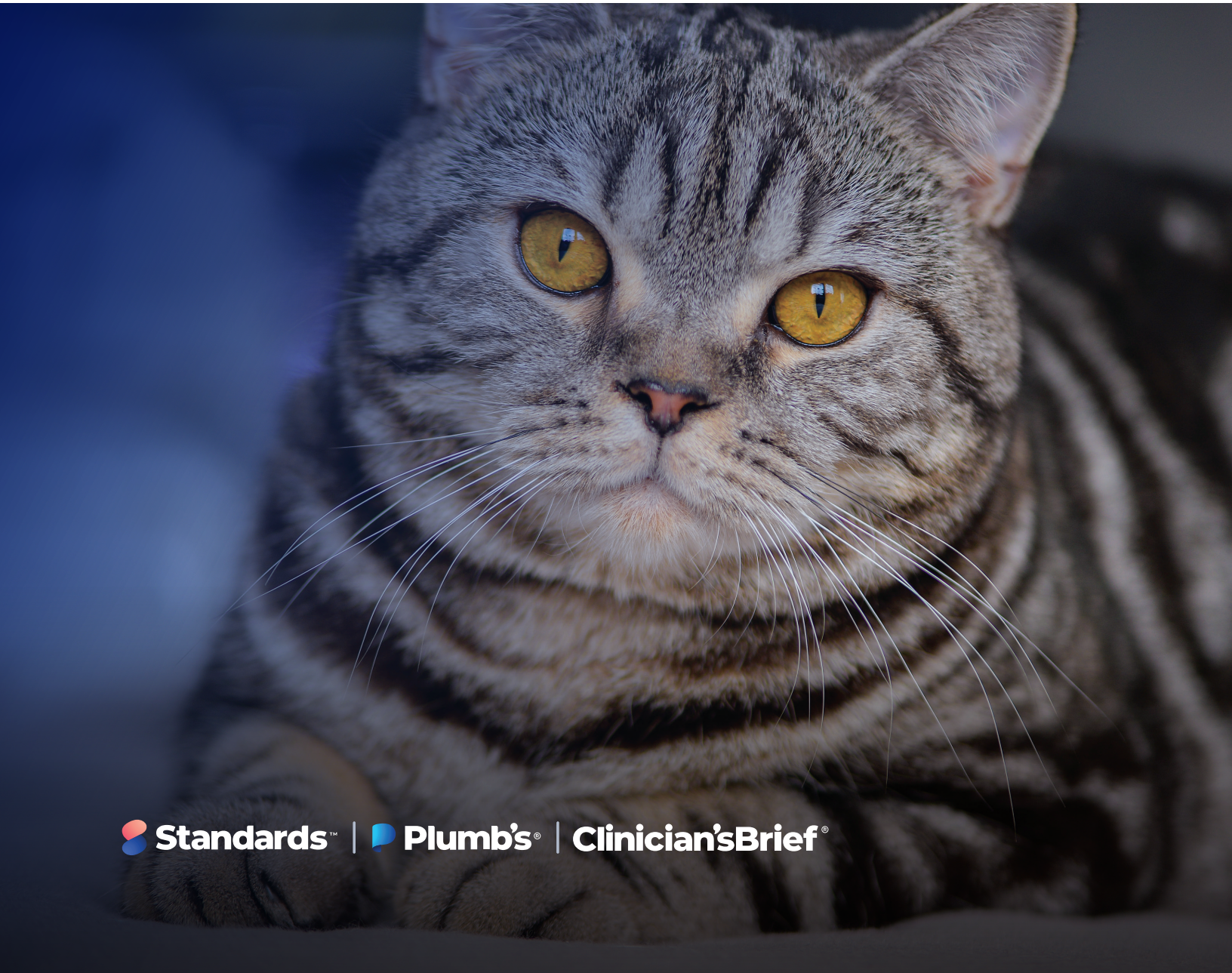
STABILIZATION OF CATS WITH URETHRAL OBSTRUCTION

Elizabeth Thomovsky, DVM, MS, DACVECC



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STABILIZATION OF CATS WITH URETHRAL OBSTRUCTION

This e-book has been adapted from a peer-reviewed Clinician's Brief article by Elizabeth Thomovsky, DVM, MS, DACVECC.

Author

Elizabeth Thomovsky, DVM, MS, DACVECC, is a clinical professor at Purdue University. Dr. Thomovsky earned her DVM from University of Missouri-Columbia, where she also pursued a residency in small animal emergency and critical care. She participated in a small animal rotating internship at University of Illinois. Her interests are in various aspects of emergency medicine, including coagulation and wound management.

About Clinician's Brief & Standards of Care

Under the leadership of a team of practicing veterinarians, Clinician's Brief and Standards of Care guide the most critical decisions in small animal medicine, driving better outcomes for veterinarians and the animals that depend on them. Clinician's Brief provides free resources designed to surround and support you through every stage of your career. Standards, a practical point-of-care tool with Plumb's built in, delivers peer-reviewed clinical guidance to help you work up cases, prescribe and dispense medications, and educate pet owners from one continually updated app and website. These products put critical information at your fingertips every day, supporting you and your team as you care for patients, build lasting relationships with pet owners, and navigate the changing dynamics of veterinary practice.

INSTINCT EMR Standards™ Plumb's® Clinician'sBrief®

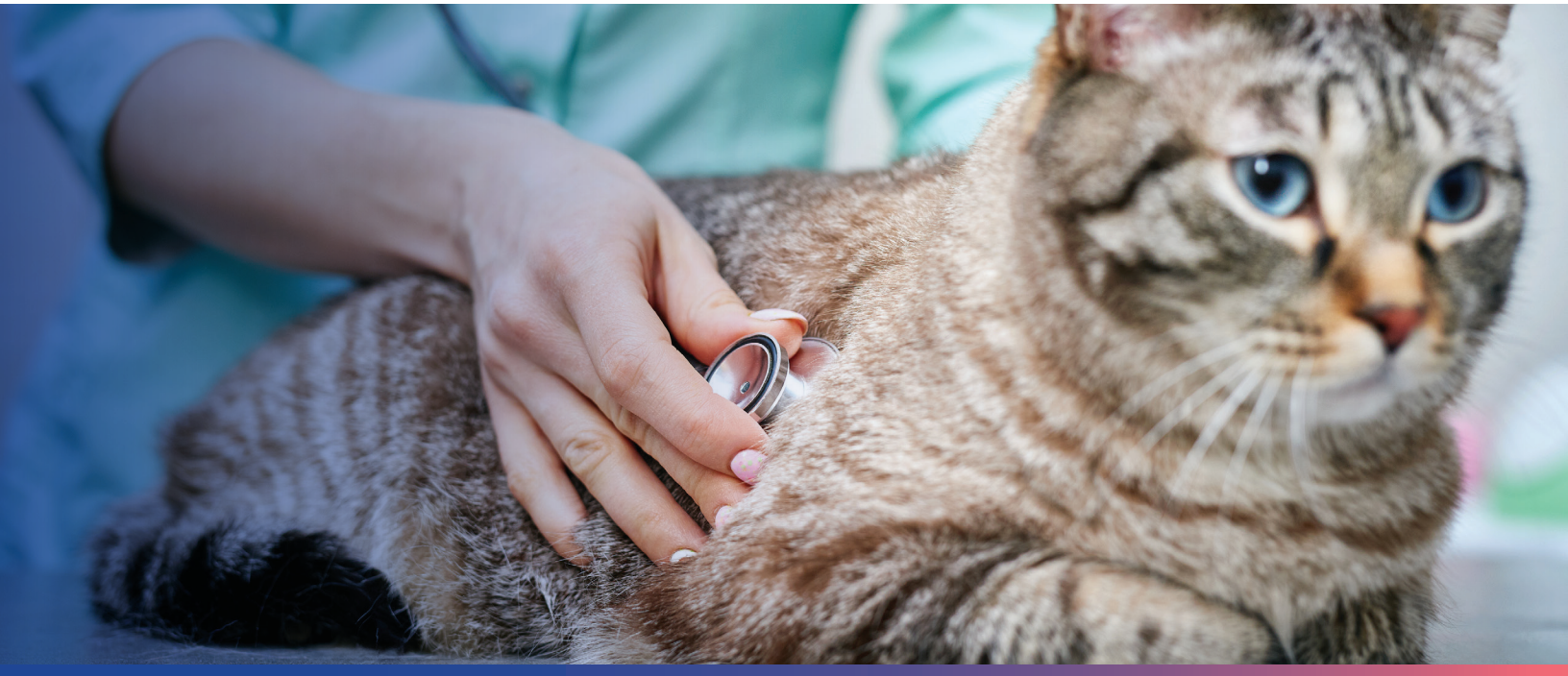
A male cat has been straining in the litter box and now he's on his way to your clinic. The moment he arrives, you can hear him yowling in pain. He's hunched in his carrier and when you gently palpate his abdomen, there's no doubt—his bladder is firm and distended. He's blocked and every minute matters.

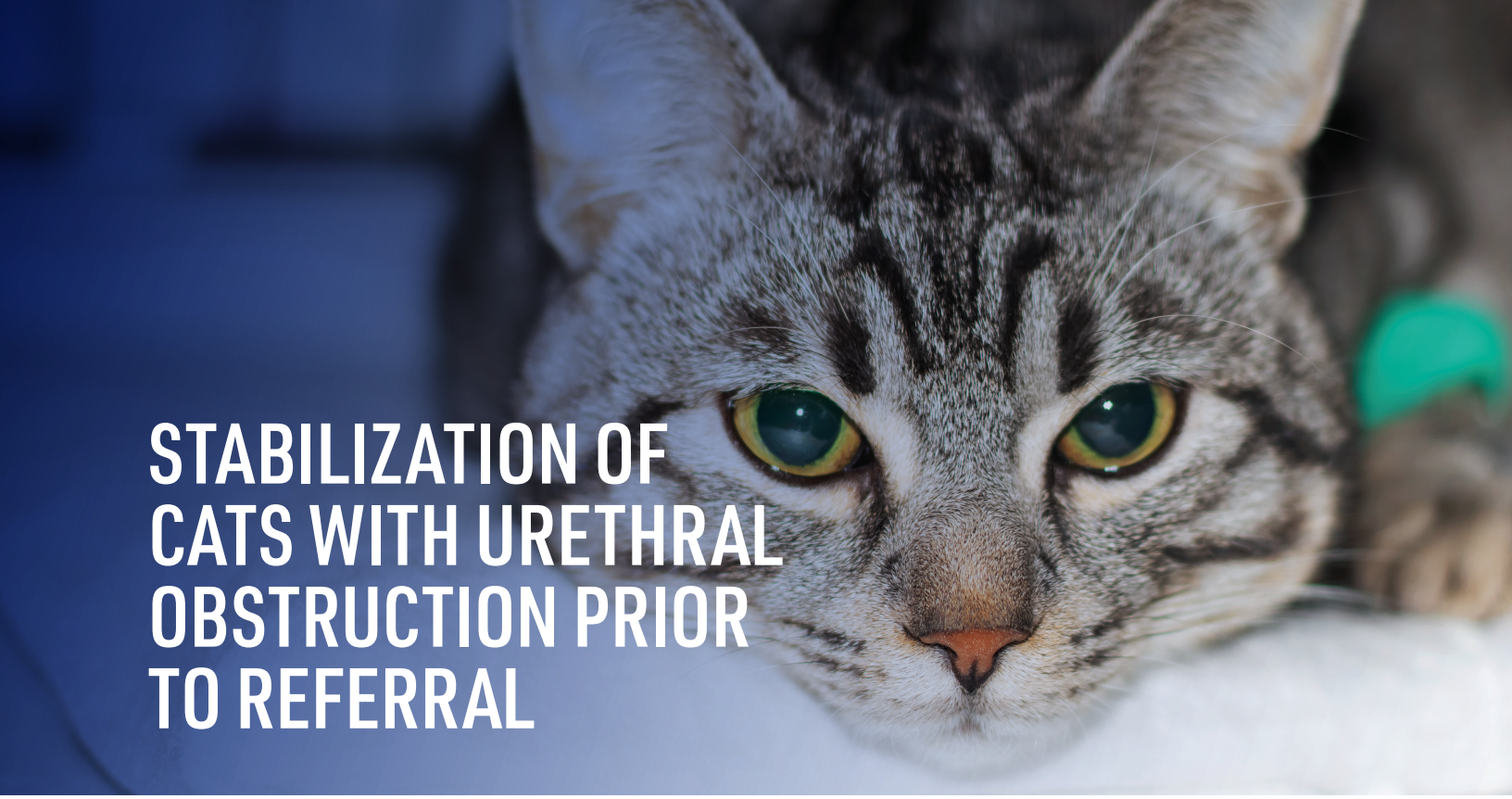
Urethral obstruction may be a common emergency, but that doesn't mean it's easy to manage. And while definitive treatment may mean referral to an emergency or specialty hospital, stabilization starts with you.

This step-by-step guide is here to support you through those early, high-stakes moments. Whether you're managing the case in-house or stabilizing for transfer, you'll find clear, practical guidance to help you act quickly and confidently.

Here's what's inside:

- **Common comorbidities at presentation:** An overview of typical physical exam and laboratory findings in cats with urethral obstruction
- **Initial patient assessment:** Guidance on prioritizing diagnostics prior to sedation or catheterization
- **Diagnostics and stabilization:** Practical strategies for managing hyperkalemia, interpreting ECGs, and selecting appropriate fluids and medications
- **Step-by-step stabilization protocol:** Detailed guidance on preparing for catheterization, starting treatment, and keeping patients stable through the process
- **Referral and transport considerations:** Tips for stabilizing patients for transfer and managing cases in which catheterization isn't possible





STABILIZATION OF CATS WITH URETHRAL OBSTRUCTION PRIOR TO REFERRAL

Urethral obstruction is common in male cats and can be idiopathic or caused by urethral mucous plugs, urolithiasis, strictures, or neoplasia.[1,2] Recommended treatment is typically urethral catheterization.[1,2]

Depending on the duration of obstruction, stabilization may be needed prior to administration of sedation or anesthesia to facilitate placement of a urinary catheter.

Common Comorbidities at Presentation

Azotemia, electrolyte abnormalities (eg, hyperkalemia), acidemia, and cardiovascular events (eg, arrhythmias) are the most common comorbidities at presentation in obstructed cats.

Blocked cats will not be completely stable until a urinary catheter is placed.

In a study of 168 cats, 57% had azotemia, 46% had hyperkalemia, 73% had acidemia, and 33.5% had arrhythmias; arrhythmias were primarily bradycardia (88.5%) and ventricular premature complexes (11.4%; see **Step 4**, page 10).[3] Absence of P waves with normal QRS complexes
(ie, atrial standstill) is also common in blocked cats with hyperkalemia.[4]

Less commonly, cats can be presented with hypovolemia and hypotension or significant clinical dehydration (53% of cats in one study).[4]

Stabilization

The goal of stabilization is to identify and address expected comorbidities to optimize the patient for safe sedation or anesthesia prior to urinary catheter placement.

Before sedation or anesthesia, cats should be normovolemic with normal blood pressure, have normal sinus rhythm on ECG, and receive treatment for hyperkalemia if potassium is >7 mEq/L (7 mmol/L).

Blocked cats will not be completely stable until a urinary catheter is placed. Unblocking should typically be attempted prior to referral for further care and hospitalization.

Tips for Client Communication During Emergencies

When a patient is critically ill, it can be especially tough to talk about money, but finances can be the deciding factor in patient care. Set up these conversations for success by:

- Providing a safe place for clients in a private room (not the waiting area) and have a seat together
- Acknowledging the client's financial strain (if applicable) and offer partnership in seeking solutions
- Asking permission before offering suggestions
- Presenting small amounts of information and pause to let the client absorb and formulate questions
- Including the rationale and benefit to the patient for the diagnostics and treatments you anticipate

Client-friendly tools like the clinical handouts in Standards can support these conversations by helping owners understand their cat's condition and process your recommendations, so they can make informed decisions (**Figure 1**).

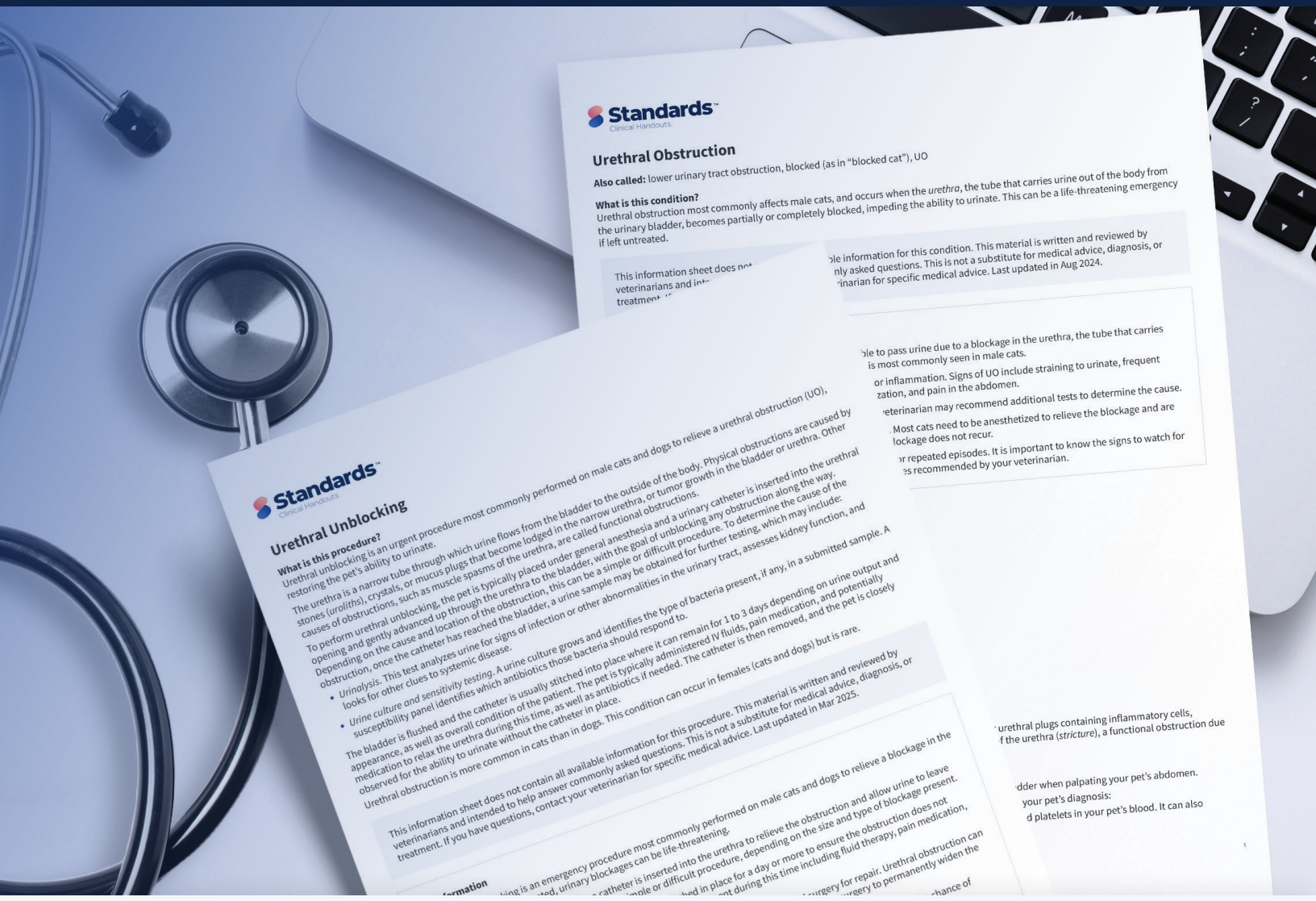


FIGURE 1 Standards of Care pet owner handouts covering urethral obstruction and urethral unblocking. Subscribers can find these handouts and many more with a quick search in the app or on the website.

STEP-BY-STEP: STABILIZATION OF CATS WITH URETHRAL OBSTRUCTION PRIOR TO REFERRAL

What You Will Need

- IV catheter
- Crystalloid fluid (typically a buffered isotonic crystalloid)[2]
- Monitoring units
  - ECG
  - Blood pressure unit (ultrasonic Doppler or oscillometric unit)
  - Blood gas analyzer or other machine capable of measuring electrolytes and, ideally, either blood pH or total carbon dioxide to estimate metabolic acidosis
- Pharmacologic interventions
  - Calcium gluconate
  - 50% dextrose
  - Regular (short-acting) insulin
  - Bicarbonate
  - Opioid pain medication (eg, buprenorphine, methadone) ± sedative (eg, acepromazine, midazolam, dexmedetomidine, ketamine)
- Urinary catheter
- Decompressive cystocentesis supplies
  - Hypodermic needle (22 gauge, 1 or 1.5 inch)
  - Stopcock
  - IV extension set
  - 12- or 20-mL syringe
  - Collection container for urine
- Forced-air warmer, circulating hot water blanket, and/or blankets

FIGURE 2 Supplies needed for initial assessment and stabilization of cats with urethral obstruction

FIGURE 3 Supplies needed for decompressive cystocentesis

Step 1: Assess the Patient

Perform a physical examination to determine whether the cat is in shock and identify any cardiovascular abnormalities (eg, murmurs, arrhythmias) before giving fluid therapy (**Figures 4** and **5**).

Author Insight

Palpating pulse quality, performing blood pressure measurement, and assessing heart rate and rhythm, mucous membrane color, rectal temperature, and general mentation can help diagnose shock. Most blocked cats are not in shock.

The author does not routinely perform blood pressure measurement unless a patient is obtunded, laterally recumbent, and bradycardic (heart rate, <160 bpm).

FIGURE 4 Abdominal palpation of a cat with suspected urethral obstruction

FIGURE 5 Cardiothoracic auscultation of a cat with suspected urethral obstruction

Whether you're starting with clinical signs or already have a working diagnosis, Standards provides tools to help you focus your approach. Use differential diagnosis (DDx) lists to generate possibilities based on clinical signs or lab results, and follow peer-reviewed algorithms for step-by-step diagnostic and treatment guidance (**Figure 6**).

FIGURE 6 A differential diagnosis list for heart murmurs in cats and an algorithm for cardiac arrhythmias. Subscribers to Standards of Care can access the full library of differential lists and algorithms from any phone, tablet, or computer.

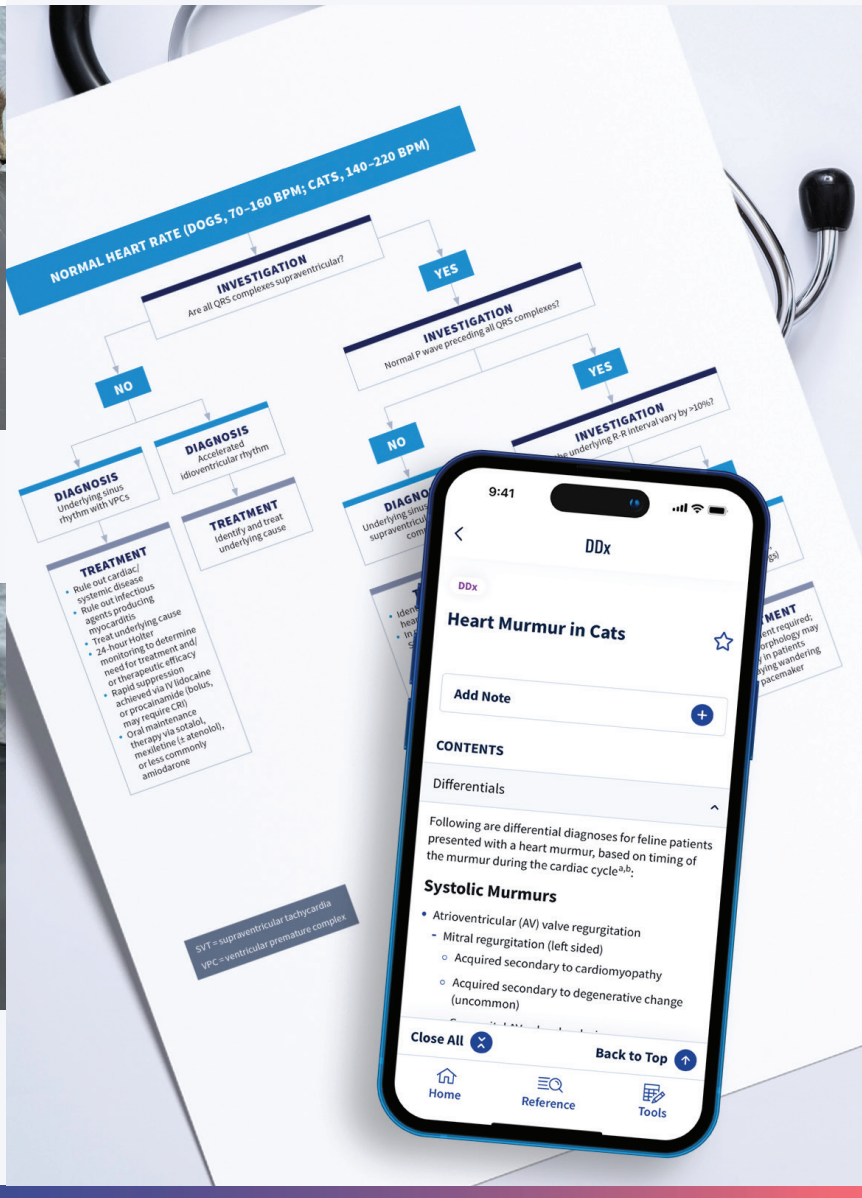


FIGURE 7 IV catheter being placed in a feline patient

Check for Potential Drug Interactions With Plumb's

In emergency situations, ruling out drug interactions is crucial for patient safety. With the drug interaction checker from Plumb's, you can enter 2 or more drugs to check for drug-to-drug interactions and find the best path forward for your patient. Plumb's is built into Standards, so Standards subscribers can access the drug interaction checker and all the species-specific drug and dosing information Plumb's is known for from any internet-connected device.

Step 2: Place an IV Catheter, Warm the Patient, & Administer Analgesics

Place an IV catheter to facilitate drug administration (eg, analgesia, anesthesia), fluid therapy, and blood sampling (**Figure 7**). Warm hypothermic cats with a forced-air warmer, circulating hot water blanket, and/or regular blankets.

Administer pain medication as indicated, but do not administer NSAIDs, as cats with urethral obstruction are often dehydrated (and/or hypovolemic) and azotemic.

Author Insight

Methadone (0.1 - 0.2 mg/kg IV) or buprenorphine (0.01 - 0.03 mg/kg IV) is commonly administered for analgesia. With buprenorphine, onset of analgesic effects can take ≥20 to 30 minutes.

In the author's experience, most cats allow IV catheter placement prior to drug administration, but painful, anxious, or fractious cats may require IM administration of opioid pain medications and sedatives to facilitate catheterization. Ideally, patients without electrolyte and ECG results should only be given opioids and benzodiazepines, but ensuring patient compliance is key because IV catheterization is important for definitive treatment (ie, placement of a urinary catheter). The author therefore administers methadone (0.1 mg/kg IM) with or without midazolam (0.2 mg/kg IM) in mildly fractious cats and methadone (0.1 mg/kg IM), dexmedetomidine (5-7 micrograms/kg IM), and ketamine (2 mg/kg IM) in moderately to severely fractious cats in an attempt to provide sufficient sedation for management with a single injection. Dexmedetomidine should be administered with caution in very sick or bradycardic cats and reserved for fractious patients.

Step 3: Acquire a Blood Sample

Ideally, perform a full serum chemistry profile and CBC. If these analyses are not practical because of the time and volume of blood required, perform a packed-cell volume/total protein measurement and a limited panel that contains BUN, creatinine, and electrolytes (primarily potassium but also sodium and chloride). Measure pH directly or estimate by the total carbon dioxide or bicarbonate if available.

Author Insight

In the author's experience, collecting a blood sample from an unflushed IV catheter at the time of catheter placement is easiest (**Figure 8**), but blood can be collected from any vessel.

Potassium >7 mEq/L (7 mmol/L) typically requires treatment (see **Step 5**, page 11), especially in patients with bradycardia or other arrhythmias or severe illness.[4,5]

Azotemia alone does not require direct treatment, as the prerenal component of azotemia improves with fluid therapy, and postrenal effects are corrected by urethral catheterization.[6]

Metabolic acidosis in obstructed cats is primarily due to azotemia, hyperphosphatemia (if present), and lactic acidosis and does not require direct treatment.

Potassium >7 mEq/L (7 mmol/L) typically requires treatment, especially in patients with bradycardia or other arrhythmias or severe illness.

FIGURE 8 Blood collection from an unflushed IV catheter in a cat

Step 4: Perform ECG

Perform ECG to determine whether an arrhythmia is present (**Figure 9**).

If an arrhythmia attributed to hyperkalemia (ie, bradycardia [**Figure 10**], atrial standstill [**Figures 11** and **12**]) or a ventricular arrhythmia is present with potassium >7 mEq/L (7 mmol/L), administer treatment for hyperkalemia (see **Step 5**, next page). Reassess the arrhythmia following treatment to determine whether it has resolved.

In less common situations in which a ventricular arrhythmia (intermittent ventricular premature complexes or sustained ventricular beats) is noted with potassium <7 mEq/L (7 mmol/L) or after treatment of hyperkalemia, administer fluids (typically, 10-20 mL/kg bolus) to improve tissue oxygen delivery and hypotension (if present) in addition to flow-by oxygen therapy.

If the arrhythmia and a heart rate >180 to 200 bpm (ie, ventricular tachycardia) persist following fluid and oxygen therapy, administer a bolus of lidocaine (0.2-0.5 mg/kg IV).

Author Insight

ECG is ideally performed prior to administration of sedatives or anesthetic drugs; however, sedation or anesthesia may be needed to obtain ECG in fractious patients.

The author does not always perform ECG in cats that are clinically bright and alert and have a heart rate >180 bpm at presentation.

The author always administers a fluid bolus (5-10 mL/kg IV over 15-30 minutes) to provide fluids prior to and during sedation/anesthesia and replace mild dehydration.

FIGURE 9 Feline patient undergoing ECG

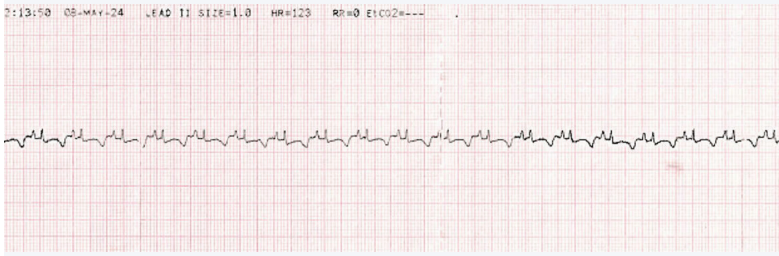


FIGURE 10 Sinus bradycardia (heart rate, 126 bpm) with P waves and deep, negatively deflected T waves

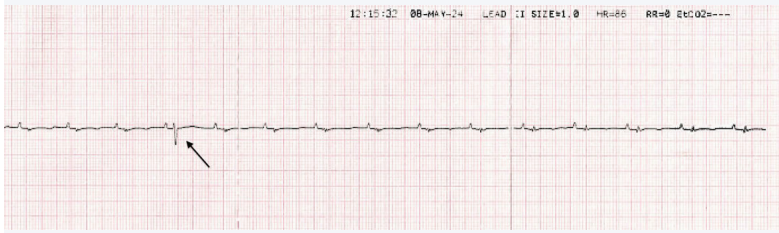


FIGURE 11 Atrial standstill with one ventricular premature complex (***arrow***), negatively deflected T waves, and absent P waves

FIGURE 12 Atrial standstill with one ventricular premature complex (***arrow***), positively deflected T waves that are as tall as QRS complexes, and absent P waves

Step 5: Treat Hyperkalemia

If hyperkalemia is present, administer IV fluids (see **Step 6**, next page) and select a cardioprotective medication that reduces blood potassium levels or improves cardiomyocyte function (**Table 1**).

Table 1. Drugs for Treatment of Hyperkalemia

Drug	Dose	Mechanism of Action	Advantages and/or Disadvantages
10% calcium gluconate	• 0.5-1 mL/kg (4.6-9.3 mg/kg of elemental calcium) IV over 10-30 minutes while monitoring ECG	• Increases threshold membrane potential of cardiac myocytes • Transiently restores normal cardiac myocyte depolarization	• Works rapidly • Duration of ≈ 30 minutes • Can induce bradycardia or asystole if given too quickly
50% dextrose and regular (short-acting) insulin	• 1 unit regular (short-acting) insulin/cat IV, followed by 2-5 g dextrose/unit of insulin IV[4] • 50% dextrose diluted with 0.9% saline to at least a 25% solution (ie, 1:1 dilution) prior to administration	• Insulin stimulates sodium-potassium adenosine triphosphatase to move potassium into cells.	• Duration of several hours • Delayed effect to reduce hyperkalemia • Blood glucose should be monitored to identify hypoglycemia. • Hypoglycemic effects may persist up to 6 hours following insulin administration[4]; some cats require bolus or CRI dextrose therapy to maintain normoglycemia during this period.
8.4% sodium bicarbonate	• (0.3 × body weight [kg] × base deficit [mEq/L]); one-fourth to one-third of the calculated dose administered IV	• Increases blood pH • Causes intracellular hydrogen ions to exchange for potassium ions in the blood	• Can cause reflex respiratory acidosis and exacerbate ionized hypocalcemia (if present) • Bicarbonate is usually not needed to correct acidemia in cats with urethral obstruction, as acidemia resolves following urinary catheterization.

Author Insight

The author prefers calcium gluconate, as administration of dextrose and regular (short-acting) insulin can induce acute or delayed (hours later) hypoglycemia, and the duration of effect of calcium gluconate is typically sufficient to unblock the cat (ie, provide definitive treatment for hyperkalemia).

Step 6: Administer Fluid Therapy

Administer buffered isotonic crystalloid fluids as appropriate to help increase the glomerular filtration rate and promote excretion of potassium, BUN, and creatinine through the kidneys (**Table 2**).

Table 2. Suggested Fluid Therapy for Common Scenarios in Blocked Cats

Clinical Situation	Suggested Therapy
Hypovolemia (pale mucous membranes, weak pulses, obtundation, hypotension)	• Administration of fluid bolus (one-quarter of blood volume [ie, 15 mL/kg] IV over 10-15 minutes), followed by reassessment of heart rate, mucous membranes, mentation, and blood pressure • Hypovolemia should be addressed prior to referral.
Azotemia/hyperkalemia (potassium >7 mEq/L [7 mmol/L], especially with associated arrhythmias) ± dehydration	• Small fluid bolus (5-10 mL/kg IV over 15-30 minutes) at time of unblocking can be considered to optimize the patient for anesthesia or sedation and correct subclinical dehydration. • Administration of maintenance fluids (40-60 mL/kg/day CRI) ± dehydration deficit replacement over 12-24 hours (estimated % dehydration × weight [kg] = L of fluid) ± drugs for treatment of hyperkalemia
Normokalemia, <7%-10% dehydration, stable patient	• No fluid therapy needed prior to unblocking • Replacement of dehydration deficit (estimated % dehydration × weight [kg] = L of fluid) over 12-24 hours and provision of maintenance fluids (40-60 mL/kg/day CRI) following urethral catheterization

Author Insight

A murmur or gallop rhythm may indicate underlying heart disease. In these cases, lower maintenance fluid rates (40 mL/kg/day CRI) should be used, and dehydration deficits should be replaced over ≥24 hours in stable patients. When bolusing fluids in hypovolemic cats with suspected heart disease, smaller boluses (5-10 mL/kg) or administration over longer periods of time (20-30 minutes) should be considered.

> **A murmur or gallop rhythm may indicate underlying heart disease. In these cases, lower maintenance fluid rates (40 mL/kg/day CRI) should be used.**

Step 7: Prepare Patient for Referral

Attempt to place a urethral catheter. If unsuccessful, determine whether the patient can be referred without catheterization and whether decompressive cystocentesis is needed.

Author Insight

Urethral Catheterization Prior to Referral (Preferred)

Cats should ideally be unblocked via placement of a urethral catheter prior to referral for 24-hour hospitalization and monitoring, especially cats that are hyperkalemic at presentation. Patients should be transferred with the urinary catheter and collection bag.

Referral Without Urethral Catheterization

If the referral clinic is ≤2 hours away and the cat is not hypotensive, bradycardic, or hyperkalemic, the patient may be referred without catheterization if catheterization is unsuccessful, thus avoiding potential complications of decompressive cystocentesis (eg, uroabdomen, trauma to the bladder wall).

If pain medications were not previously administered as part of IV or urethral catheterization attempts, an opioid pain medication can be administered (see **Step 2,** page 8).

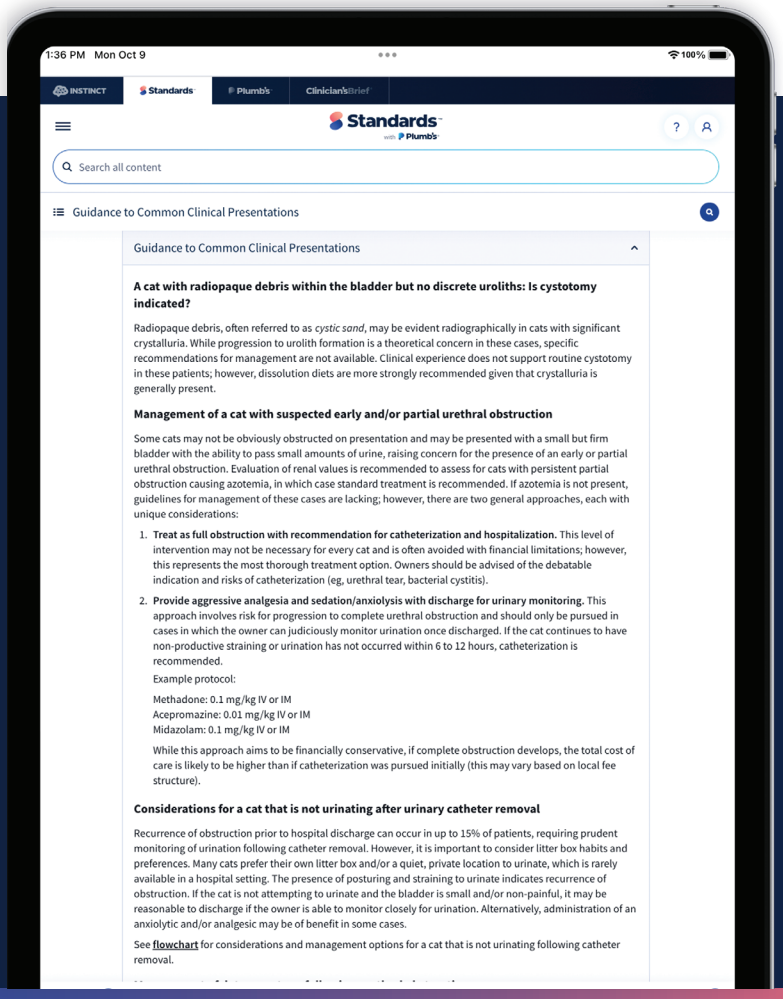
Decompressive Cystocentesis Prior to Referral

If the referral clinic is >2 hours away or the cat was hypotensive, bradycardic, and/or hyperkalemic at presentation, decompressive cystocentesis should be performed to maintain patient stability during transit (see **Step-by-Step: Decompressive Cystocentesis**, next page).

Pet owners should be informed of risk for bladder trauma and/or uroabdomen with decompressive cystocentesis. Uroabdomen is typically identified by the referral clinic prior to urethral catheterization or after manipulating a damaged bladder during urethral catheterization.

Discover Your Next Steps With Standards

Clinical monographs in Standards offer peer-reviewed, practical guidance for real-world scenarios—like managing partial obstructions or recurrent cases. Like all Standards content, they're continually updated and accessible from any internet-connected device, so you always have clinical support at your fingertips.



STEP-BY-STEP: DECOMPRESSIVE CYSTOCENTESIS

Step 1

Administer sedation if needed to prevent patient movement and minimize the likelihood of bladder trauma.

Step 2

Place a 22-gauge, 1- or 1.5-inch needle in the center of the urinary bladder at a 30- to 90-degree angle to the body using palpation (blind) or ultrasound guidance. If needed, use one hand to stabilize the urinary bladder while the needle is inserted.

Step 3

Attach the needle to an extension set, stopcock, and syringe (**Figure 13**).

Step 4

Drain as much urine as possible from the bladder.

Author Insight

A 1.5-inch needle helps ensure the needle remains in the urinary bladder as the bladder shrinks during emptying. Repeatedly puncturing the bladder should be avoided to reduce the likelihood of compromising the bladder wall, which can lead to uroabdomen.

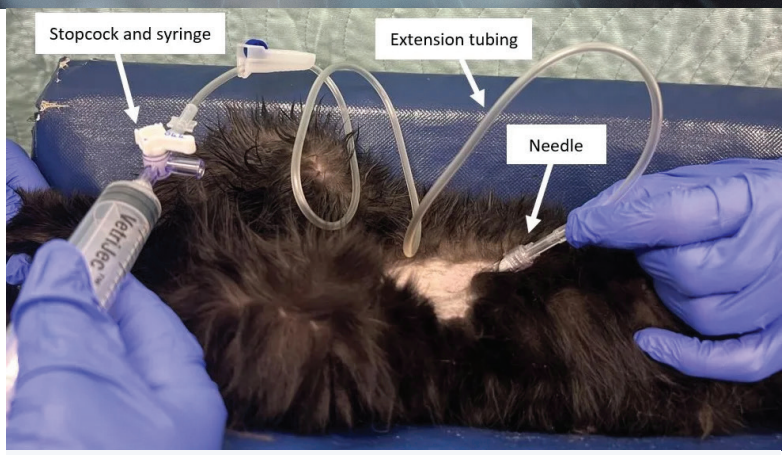
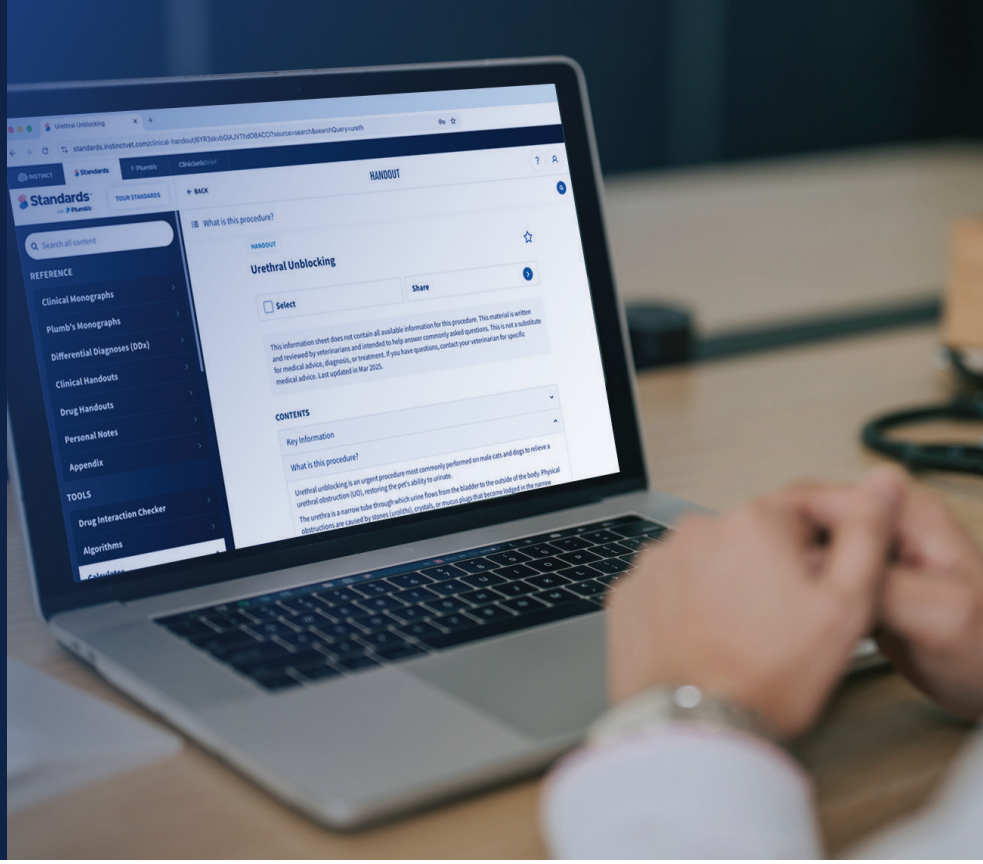


FIGURE 13 Assembled needle and extension set for decompressive cystocentesis

Repeatedly puncturing the bladder should be avoided to reduce the likelihood of compromising the bladder wall, which can lead to uroabdomen.

About Standards of Care

Standards of Care is a clinical decision support tool that helps veterinary professionals make confident, informed decisions from diagnosis to discharge. With expert-backed, continually updated guidance and Plumb's built in, it empowers teams to navigate complex cases, tailor treatments, and provide clear client education—all from one easy-to-use platform. By integrating a spectrum of care approach, Standards balances best practices with the unique real-world needs of each patient and client. Learn more about subscribing at **standards.vet**.



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