

Safely Unobstructing the Urethra of Male Cats

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Key Points

- When admitting young male cats in a medical crisis, always assess urinary bladder size. Cats with severe and prolonged urethral obstruction are depressed and dehydrated, and rarely present with signs referable to the urinary tract.
- Remember the **S.A.F.E.** approach (**S**tabilize first, **A**ccurate diagnosis, **F**lush, don't force, **E**xtend the urethra caudally) for removing urethral obstructions in male cats.
- Determining the cause of urethral obstruction is essential for developing an appropriate therapeutic plan to alleviate obstruction and recommend appropriate measures to prevent recurrence.

Introduction

Urethral obstruction usually occurs in male cats and most often is caused by the formation of urethral plugs, passage of uroliths from the urinary bladder into the urethra, and/or inflammation and swelling associated with feline idiopathic cystitis and likely urethritis. Initial management is aimed at removing the obstruction and establishing urethral patency. Treatment of urethral obstruction can be associated with complications including urinary bladder rupture, uroabdomen, urethral tear, urethral stricture and periurethral cellulitis.^{1,2} To minimize unrealistic expectations associated with correcting urethral obstruction, informed consent is essential.

S.A.F.E. Approach

We use the acronym **S.A.F.E.** as a reminder of the important steps to safely remove urethral obstructions from male cats.

S = Stabilize first

A = Accurate diagnosis

F = Flush, don't force catheters through the urethra

E = Extend the urethra caudally when inserting catheters to flush the urethra

Stabilize First

Before correcting the urethral obstruction, first stabilize the patient (i.e., minimize hypothermia, azotemia, acidemia, hyperkalemia and hypocalcemia prior to general anesthesia) (**Table 1**). Consider placing an intravenous access line, particularly in cats that need intensive monitoring (e.g., cardiac arrhythmias) or intravenous treatments (e.g., fluids, analgesic/anesthetic agents).

Cats with urethral obstruction and urinary bladder over-distension are often experiencing a high degree of pain and anxiety. To facilitate physical examination, radiography and safe urinary bladder decompression, provide prudent amounts of analgesia (e.g., butorphanol 0.2 to 0.3 mg/kg and midazolam 0.2 mg/kg intramuscularly or intravenously). For cats experiencing higher degrees of anxiety, consider adding 1 to 5 mg/kg of ketamine intravenously.

If the urinary bladder is distended even moderately, perform decompressive cystocentesis (**Figure 1**). Some have cautioned against using decompressive cystocentesis³; however, it has several advantages for managing cats with urethral obstruction:

- Avoids repeat cystocentesis in cats with large volumes of urine
- Provides appropriate samples for urinalysis and culture
- Reduces discomfort and pain associated with over-distention of the urinary bladder
- Reduces biochemical consequences of urethral obstruction (e.g., acidemia, hyperkalemia, azotemia)
- Decreases resistance to retrograde flushing of the urethra

Once stabilized, patients can be more safely anesthetized to flush the urethra.

Table 1. Correcting metabolic consequences of urethral obstruction.

Consequence	Indications to treat	Therapy
Hypothermia	Core temperature less than 99° F or cardiac decompensation	<ul style="list-style-type: none"> • Heating pad • Heat lamps • Infusion of warm saline
Hypovolemia	Azotemia Cardiovascular collapse	<ul style="list-style-type: none"> • Replace deficits in 2 to 12 hours with 0.9% saline. • Consider an initial bolus of fluids (10 to 30 ml/kg) to rapidly correct hypovolemia if needed. • Saline has been recommended because patients are often hyperkalemic; however, any balanced electrolyte solution will help.
Azotemia	If serum creatinine is greater than 2 mg/dl	<ul style="list-style-type: none"> • Replace fluid deficits using a balanced electrolyte solution. • Perform decompressive cystocentesis to promote renal excretion.
Acidemia	If blood pH < 7.2	<ul style="list-style-type: none"> • Administer 1/3 to 1/2 of the dose of NaHCO₃ [0.3 x BW (kg) x base deficit] over 15 minutes. Avoid rapid or excessive administration of bicarbonate, which may exacerbate hypocalcemia. • Administer fluids to correct hypovolemia. • Perform decompressive cystocentesis to promote renal excretion.
Hyperkalemia	Weakness or shock due to cardiovascular depression	<ul style="list-style-type: none"> • To promote potassium excretion: <ul style="list-style-type: none"> - Decompressive cystocentesis - Fluid administration with potassium sparing fluids • To promote intracellular translocation of potassium: <ul style="list-style-type: none"> - Correct metabolic acidosis with sodium bicarbonate mmol = 1/3 [0.3 x BW (kg) x base deficit] - Administer 0.1 U/kg regular insulin IV with 1 gram of glucose per unit of insulin • To antagonize adverse cardiac effects: <ul style="list-style-type: none"> - Administer 50 to 100 mg/kg calcium gluconate slowly (over 2-5 min) IV
Hypocalcemia	Hypocalcemic tetany or hyperkalemic cardiac decompensation	<ul style="list-style-type: none"> • Administer 50 to 100 mg/kg calcium gluconate slowly (2 to 5 min) IV with continuous cardiac monitoring.



Figure 1. Items used for decompressive cystocentesis include a 1.5-inch, 22 gauge needle, intravenous extension tubing, three-way stopcock, and large syringe (≥ 20 ml).

Accurate Diagnosis

After the patient is stabilized, complete the physical examination and perform abdominal radiography to verify urinary bladder size and to determine the cause of urethral obstruction. Remember to include the entire urethra in the radiographic field of view. In very sick cats, these steps can be combined with stabilization of the patient (**Table 1**), which usually include decompressive cystocentesis. Knowing the cause of urethral obstruction is essential to develop a feasible therapeutic plan for alleviating obstruction and preventing recurrence (**Table 2**).

Flush, Don't Force

Administer appropriate and sufficient anesthesia to abolish urethral pain to facilitate urethral manipulation. We commonly use ketamine (2 to 4 mg/kg IV) and diazepam

(0.2 to 0.3 mg/kg IV); diazepam can replace midazolam (0.1 to 0.2 mg/kg IV). Acepromazine (0.05 mg/kg IV) is included for cats with adequate blood pressure; it reduces anxiety and promotes urethral relaxation.

There are several techniques to remove obstructions from the urethral lumen (**Tables 3 and 4**). Selection of the procedure depends on the cause of the obstruction and the severity of life-threatening metabolic abnormalities. In some cases, cost may also dictate the extent of diagnosis, treatment and monitoring.

To prevent urethral trauma, do not force catheters through the urethral lumen. First, clear the lumen by using a catheter to flush sterile saline. Once cleared, a lubricated catheter of appropriate size should easily traverse the urethral lumen and enter the urinary bladder.

Avoid attaching the urinary catheter directly to the syringe; use intravenous extension tubing to connect the urethral catheter and syringe (**Figure 2**). Use a small syringe (3 to 12 ml) initially to remove the obstruction; a larger syringe can then be used to flush additional fluids through the urethral catheter if needed. Evacuate air from these lines by flushing saline through the assembled supplies. To keep the urethra exteriorized caudally, have an assistant operate the syringe that is used to flush the urethra.

Table 2. Characteristics of methods to relieve urethral obstruction in male cats.

Procedure	Retrograde flushing without urethral occlusion	Retrograde flushing with urethral occlusion	Antegrade expulsion via urinary bladder expression	Antegrade expulsion via pharmacologic manipulation
Indications	<ul style="list-style-type: none"> Matrix crystalline plugs Blood clots 	<ul style="list-style-type: none"> Matrix crystalline plugs Urethroliths Blood clots Solid foreign material 	<ul style="list-style-type: none"> Matrix crystalline plugs Blood clots Mural edema or inflammation Urethral spasm 	<ul style="list-style-type: none"> Matrix crystalline plugs Blood clots Mural edema or inflammation Urethral spasm
Contraindications	<ul style="list-style-type: none"> Mural edema or inflammation Urethral spasm 	<ul style="list-style-type: none"> Mural edema/inflammation Urethral spasm 	<ul style="list-style-type: none"> Urethroliths Solid foreign material 	<ul style="list-style-type: none"> Urethroliths Solid foreign material
Analgesia or Sedation	Consider	Consider	Consider	Consider
Anesthesia	Yes	Yes	Yes	Yes
Decompressive cystocentesis	Not necessary	Yes	No	Yes, multiple
Urethral catheterization	Yes	Yes	No	No
Potential advantages	<ul style="list-style-type: none"> No need for cystocentesis Rapid reversal of azotemia 	<ul style="list-style-type: none"> Very successful Rapid reversal of azotemia 	<ul style="list-style-type: none"> Avoid iatrogenic urethral trauma Reduced cost 	<ul style="list-style-type: none"> Avoid iatrogenic urethral trauma Reduced cost
Potential disadvantages	Urethral trauma or inflammation	Urethral trauma or inflammation	<ul style="list-style-type: none"> Bladder trauma, uroabdomen, or hemoabdomen Poor success 	<ul style="list-style-type: none"> Bladder trauma, uroabdomen, or hemoabdomen

Extend the Urethra Caudally

Urethral trauma associated with urethral catheterization is a potential cause of urethral rupture, uroabdomen and urethral strictures in cats.^{1,2} To prevent urethral damage, it is very important to extend the urethra caudally and dorsally before advancing a catheter. This eliminates the distal urethral flexure that is easily ruptured during forceful catheterization.

Table 3. Retrograde flushing techniques to relieve urethral obstruction in male cats.

Retrograde Flushing Without Occluding the Distal Urethra

1. Massage the distal urethra by rolling it between your thumb and forefinger with the goal of disrupting the continuity of a urethral plug. Exteriorizing the penis may facilitate this process.
2. Assemble the urethral catheter, intravenous extension tubing and large syringe filled with normal saline. For this procedure, we prefer the open-end 3.5-Fr tomcat catheter. Evacuate air from these lines by flushing saline through the assembled supplies.
3. Exteriorize penis caudally and dorsally so that it is parallel with the spine.
4. Without using excessive force, slowly insert the tip of the urinary catheter into the urethra and advance the catheter to the site of obstruction.
5. Flush large quantities of physiologic saline into the urethral lumen allowing it to reflux back out of the external urethral orifice. As the plug disrupts, advance the catheter slowly toward the urinary bladder.
6. After the tip of the catheter reaches the urinary bladder, use the syringe to remove urine from the bladder.

Retrograde Flushing While Occluding the Distal Urethra

1. If the bladder is distended even moderately, perform decompressive cystocentesis using a 22 gauge, 1.5-inch needle attached to an intravenous collection set, three-way stopcock and syringe.
2. Select an olive-tip urethral catheter (or other suitable catheter). Assemble the urethral catheter, intravenous extension tubing, and small syringe (3 to 12 ml) filled with normal saline (**Figure 2**). Evacuate air from lines by flushing saline through the assembled supplies.
3. Exteriorize the penis caudally and dorsally so that it is parallel with the spine.
4. Without using excessive force, slowly insert the tip of the urinary catheter into the urethra and advance the catheter to the site of obstruction.
5. With the catheter in place, occlude the urethra around the catheter shaft using your first finger and thumb. Placing a moistened gauze sponge or pad between the urethra and your fingers will minimize trauma to the surface of the urethra.
6. Stretch the urethra caudally and dorsally while an assistant depresses the plunger of the syringe to flush the urethra clear of its obstruction. By preventing reflux of solutions out of the external urethral orifice, this maneuver dilates the urethra and flushes the plug or urethrolith into the urinary bladder.
7. Once the urethral lumen is cleared, advance a 3.5 or 5-Fr red rubber catheter slowly toward the urinary bladder. Additional flushing may assist its insertion, but is rarely needed.
8. After the tip of the catheter reaches the urinary bladder, use the syringe to remove urine from the bladder.



Figure 2. A urinary catheter, extension tubing, and syringe can be used to effectively flush the urethra of obstructed male cats and help minimize urethral trauma.

Additional Recommendations

After the urethral obstruction has been relieved, use buprenorphine (0.005 to 0.015 mg/kg SC, PO (every 8 to 12 hours) to minimize pain; we often add acepromazine (0.05 mg/kg SC every 12 hours) for difficult cases and fractious cats that may need additional sedation.

Avoid placing an indwelling transurethral catheter if it is not needed. This decision is based on several factors including: 1) duration of obstruction, 2) difficulty of removing the obstruction, 3) size of urine stream after relief of obstruction, 4) urinary bladder tone and 5) the magnitude of azotemia.

If urine is sterile, delay antimicrobial administration until the indwelling urinary catheter is removed. By doing so, antimicrobial-resistant infections are minimized.⁴

Table 4. Antegrade expulsion techniques to relieve urethral obstruction in male cats.

<p>Antegrade Evacuation via Urinary Bladder Compression</p> <ol style="list-style-type: none">1. Massage the distal urethra by rolling it between your thumb and forefinger with the goal of disrupting the continuity of a urethral plug. Exteriorizing the penis may facilitate this process. The plug can also be disrupted by flushing large quantities of saline into the urethra (see retrograde flushing without occluding the distal urethra for a description of this technique).2. Provide steady, but not excessive, manual pressure on the urinary bladder to evacuate the plug. Avoid excessive pressure because it may result in trauma to the urinary bladder wall, reflux of potentially infected urine into the ureters, and/or rupture of the bladder wall. In some cases the pressure in the urinary bladder will evacuate a plug without manual compression of the bladder.
<p>Antegrade Evacuation via Pharmacologic Relaxation of the Urethra</p> <ol style="list-style-type: none">1. Administer acepromazine (0.25 mg IM or 2.5 mg PO per cat) and buprenorphine (0.075 mg PO per cat) 3 times daily. If the cat has not urinated in 24 hours, administering medetomidine (0.1 mg IM per cat) has been recommended.⁵2. Placing cats in a dark, quiet environment may help minimize environmental stimulation.3. Perform decompressive cystocentesis as needed to keep urinary bladder small (at least three times a day)4. Cats are expected to begin urinating in 3 days. If unsuccessful, reassess the diagnosis and consider other methods of correcting urethral obstructing.

If hydration cannot be monitored and maintained, avoid non-steroidal anti-inflammatory drugs in order to minimize iatrogenic renal damage.

If an intact plug is retrieved, submit half of the plug (dry) to the Minnesota Urolith Center for quantitative mineral analysis.⁶ The other half can be preserved for histopathologic evaluation.

Preventing Recurrence

After correction of urethral obstruction, it is important to implement measures to prevent recurrence. Preventive recommendations will depend on the underlying cause of obstruction (e.g., struvite uroliths, struvite urethral plug, calcium oxalate uroliths, feline idiopathic cystitis) and usually include nutritional and pharmacological therapies. For detailed information on medical management of these disorders, see other articles in these proceedings.^{7,8}

Summary

Cats with severe and prolonged urethral obstruction rarely present with clinical signs of urinary tract disease. Therefore, always assess urinary bladder size in male cats presented in a medical crisis. Remember the **S.A.F.E.** approach for removing urethral obstructions: **S**tabilize first, **A**ccurate diagnosis, **F**lush, don't force, and **E**xtend the urethra caudally. Survey radiography is very helpful for determining the cause of urethral obstruction; always remember to include the entire urethra in the radiograph. After confirming the cause of obstruction, implement preventive measures to decrease the risk for recurrence.

References

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