

Peer Reviewed

Daniel Degner, DVM, Diplomate ACVS
BluePearl Veterinary Partners
Auburn Hills, Michigan

Urinary Obstruction: Treatment Measures

Urinary obstruction is a common condition seen in both dogs and cats. In dogs, acute obstruction is typically caused by urinary calculi lodged in the urethra, while in cats mucus plugs, crystalline plugs, and stones frequently cause obstruction. Other causes in dogs include neoplasia, polyps, scar tissue, strictures, or other functional abnormalities. Within 12 to 24 hours after complete urinary obstruction, serious metabolic disturbances can develop, including metabolic acidosis, azotemia, hyperphosphatemia, and hyperkalemia.

ASSESSMENT & STABILIZATION

Critical care stabilization, including crystalloid fluid therapy, cardiac stabilization, and potentially decompressive cystocentesis, should be initiated before relieving any urinary obstruction (see **assessment and stabilization checklists**). Because hypothermia can be found in advanced stages of urinary obstruction, the patient should be wrapped in a warming blanket. Cardiac rhythm should be assessed with an ECG and in-house stat blood work conducted to evaluate electrolytes, acid-base status, and azotemia.

If hyperkalemia is affecting cardiac function, administration of insulin and IV glucose or calcium gluconate may be beneficial. If the patient is obtunded, general anesthesia should be avoided during the initial attempt to relieve urinary obstruction. Lateral abdominal radiography should also be performed to assess the causes of obstruction prior to correction.

ECG = electrocardiogram, IV = intravenous

INITIAL ASSESSMENT CHECKLIST

- Check for hydration, shock, and hypothermia
- Obtain ECG
- Evaluate electrolytes, acid-base status, and azotemia
- Perform abdominal radiography



Hints for Urinary Obstruction Relief

FOR DOGS

A combination of lidocaine 2% and sterile K-Y jelly (Johnson & Johnson, k-y.com) may be mixed in a syringe and injected into the urethra via a urinary catheter after occluding the penile tip in males. Absorption of lidocaine should not cause systemic toxicity, even in patients with cardiac arrhythmias. The mixture should sit for approximately 10 minutes. This may relieve urethrosppasm and increase the likelihood of flushing urethral calculi into the bladder.

If this is ineffective, general anesthesia and epidural injection of bupivacaine and morphine may be needed to relax the urethra. An appropriately sized urinary catheter is passed retrograde to the level of

the urinary obstruction. A gloved finger via the rectum is used to compress the urethra proximal to the obstructing stone.

Saline is injected via the catheter to distend the urethra, then the urethral compression with the finger is released and the urinary stone flushed into the bladder. If this is unsuccessful, the process is repeated. If the stone cannot be retropulsed back into the bladder and the patient has major metabolic derangements, a temporary cystostomy tube (Stamey or nephrostomy catheter) can be inserted percutaneously into the bladder. After electrolyte abnormalities, acidosis, and azotemia have resolved, urethrostomy is performed.

FOR CATS

Unless the cat is obtunded, sedation or general anesthesia is usually required to relieve urethral obstruction. The tip of the penis should be massaged to loosen mucus or crystalline plugs. The penis is extruded and pulled caudally to straighten out the urethral path, and the prepuce is grasped at its reflection. A 22-gauge lacrimal catheter can be used to flush the urethra. Other options would include the use of an olive-tip catheter or an open-ended Tomcat catheter. After relieving urinary obstruction, a 3-French red rubber catheter (or other soft catheter) should be placed and connected to a closed urinary collection system.

INITIAL STABILIZATION CHECKLIST

- Warm the patient
- Start IV crystalloid fluid therapy
- Address hyperkalemia if heart is affected
 - Inject IV calcium gluconate
 - Inject IV dextrose and regular insulin
- Treat metabolic acidosis only if very severe
- Relieve urethral obstruction
- Perform cystocentesis to empty bladder if urethral obstruction cannot be relieved

WHAT YOU WILL NEED

- Needle holder
- Curved mosquito forceps
- Straight mosquito forceps
- Adson thumb forceps
- Severin tenotomy or iris scissors
- Mayo scissors
- Scalpel handle
- No. 15 and 11 scalpel blades
- Small Gelpi retractors
- 8-French red rubber catheter
- Open-ended Tomcat catheter
- 5-0 Prolene suture (ethicon.com) and RB-1 taper point needle
- 12-mL syringe

CONTINUES

STEP-BY-STEP URINARY OBSTRUCTION

FELINE PERINEAL URETHROSTOMY

Most cats that develop urinary obstruction do not require surgery unless the obstruction is caused by urinary calculi that could not be medically dissolved or have recurrences of urinary obstruction, regardless of cause. Complications could include hemorrhage, leakage of urine into subcutaneous tissues with subsequent tissue necrosis, bacterial cystitis, and urethral stricture.¹

The traditional positioning for feline perineal urethrostomy is ventral recumbency with the hindlimbs hanging over the end of the operating table. An alternate position is dorsal recumbency, which allows the surgery to be performed more easily than traditional positioning does.

STEP 1

With the patient in a V-trough and the hindlimbs pulled cranially, place a small towel under the patient's hindquarters so the perineal region is oriented toward the surgeon.



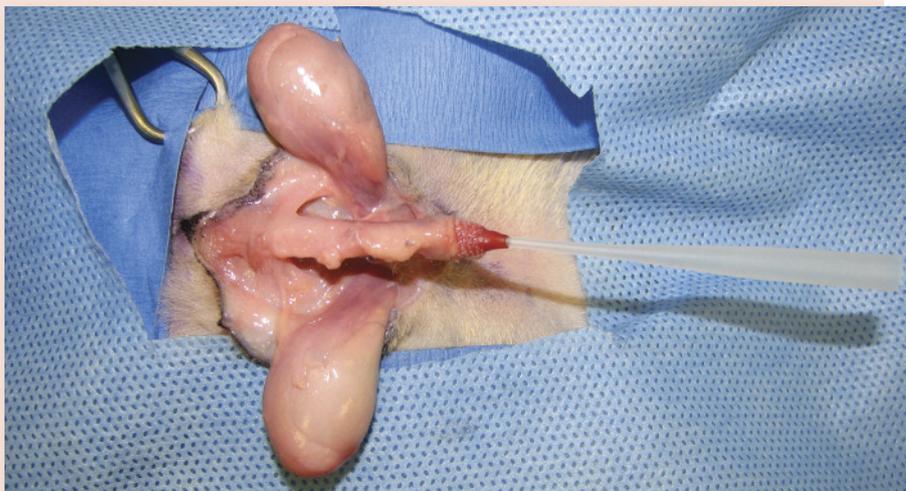
STEP 2

Make an incision starting just cranial to the prepuce and curving around the scrotum (corresponding to the **black line** shown). As the skin is elevated, the scrotal artery and vein need to be cauterized and divided on both sides of the scrotum.



STEP 3

The skin is excised to expose the testicles (intact male) and penis. A closed castration is performed by double ligation, along with dividing the spermatic cords.

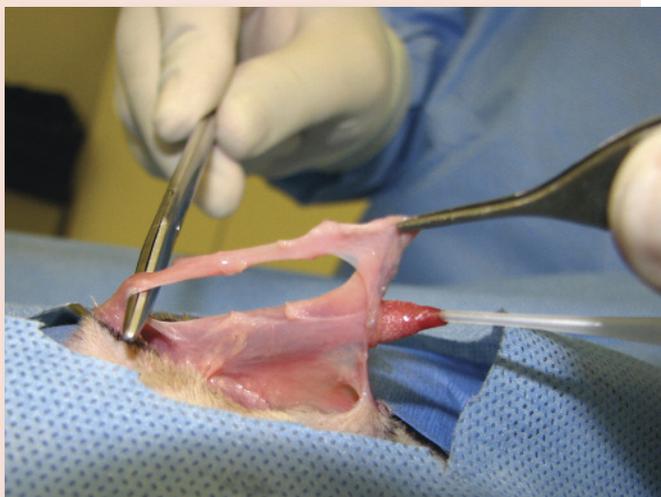


AUTHOR INSIGHT

The procedure, minus removal of testicles, is the same for castrated males.

STEP 4

To expose the corpus spongiosum on the ventral aspect of the penis, overlying subcutaneous tissues and retractor penis muscles are excised.



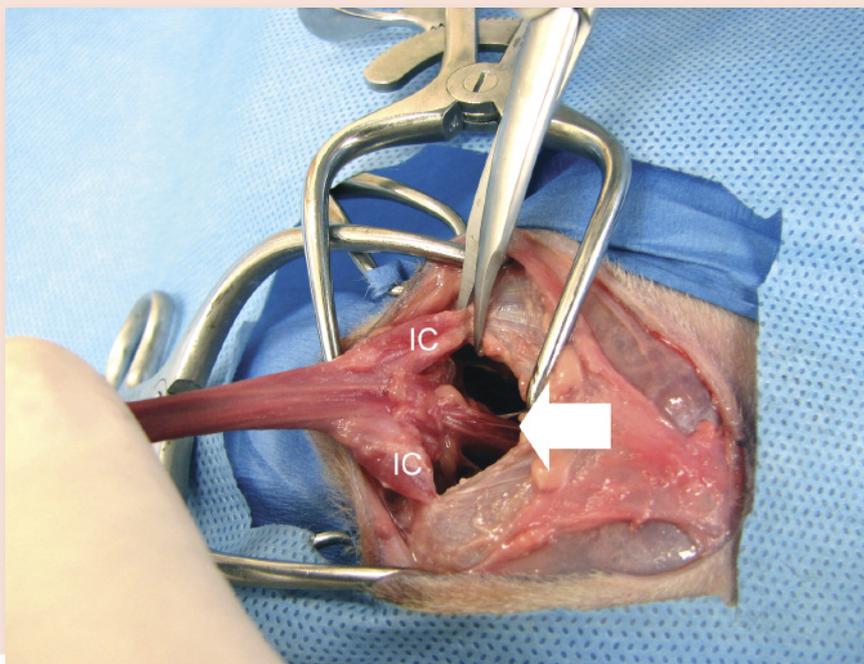
STEP 5

From a cranial-to-caudal direction, the penis is dissected from the ventral aspect of the pelvis and reflected caudally.



STEP 6

The ventral ligament of the penis (arrow), identified as a band of tissue extending from the floor of the pelvis to the ventral base of the penis, is divided with tenotomy scissors. The ischiocavernosus muscles attached from the base of the penis to the caudal aspect of the pelvis are divided with scissors at the level of the pelvis. Vessels that may run with the ischiocavernosus (IC) muscles at the level of the pelvic attachment are cauterized.



AUTHOR INSIGHT

Avoid direct cauterization of penile tissue.

CONTINUES

AUTHOR INSIGHT

The urethral mucosa should not be directly handled with thumb forceps, as doing so may result in tissue trauma and stricture formation. The mucosa must be in direct apposition with the skin edge to promote direct healing.

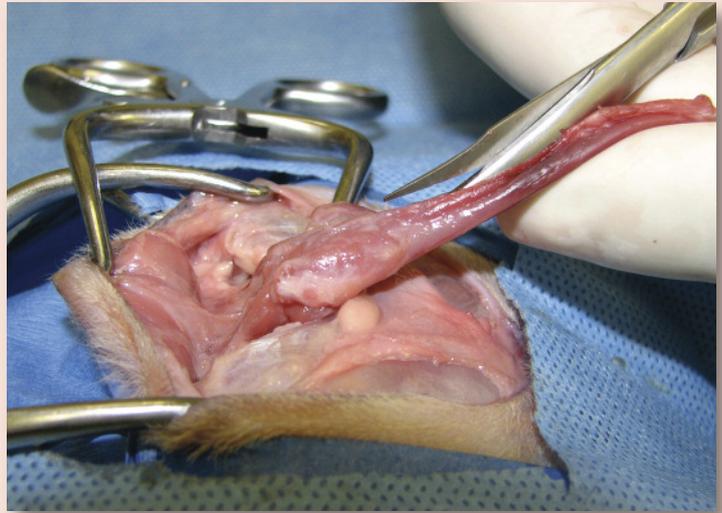
STEP 7

The bulbourethral glands (arrows) are identified just cranial to the ischiocavernosus muscles as two spherical structures on each side of the penis. This anatomic landmark is the cranial extent of the urethrostomy incision.



STEP 8

The urethra is incised longitudinally with a No. 11 blade near the distal aspect of the penis. A Tomcat catheter prevents inadvertent incision of the opposite wall of the urethra. The catheter is removed, and tenotomy or iris scissors are used to incise the urethra to the level of the bulbourethral glands.



STEP 9

An 8-French red rubber catheter is inserted into the urethral opening. The first simple interrupted suture is placed from the crotch of the urethral incision to the caudal aspect of the skin incision. The remaining interrupted sutures are placed using 5-0 Prolene suture, which is non-reactive to the tissues. An alternate technique is a simple continuous suture pattern using absorbable suture material. Both techniques have a low incidence of urethral stricture.



STEP 10

After the distal tip of the penis is amputated at the reflection of the prepuce, a transfixation ligature is placed at the distal penis to prevent bleeding from the corpus spongiosum and cavernosum. The remaining sutures are placed to complete the urethrostomy.



NSAID = nonsteroidal antiinflammatory agent

AUTHOR INSIGHT

Bleeding is expected and will continue until the procedure has been completed.

AUTHOR INSIGHT

Ensure that the ostium of the urethrostomy site is patent and located at the caudal aspect of the pelvis. If the urethrostomy ostium is more cranially located, urine splashing on the inner thighs will probably occur.

STEP-BY-STEP URINARY OBSTRUCTION

CANINE SCROTAL URETHROSTOMY

STEP 1

With the dog in dorsal recumbency, insert a urinary catheter (if possible) into the bladder. However, if the dog has a nonreducible stone lodged at the base of the os penis, this step is not possible and scrotal urethrostomy may be indicated. Other indications for scrotal urethrostomy include penile tumors, recurring urinary obstruction, strictures of the urethral distal to the scrotal urethra, and penile necrosis from iatrogenic trauma during castration (penile ligation).



In intact males, scrotal ablation with castration is performed. If the patient is neutered, a 3-cm skin incision is made starting at the caudal aspect of the pelvis and extending cranially. The subcutaneous tissues are removed from the ventral aspect of the penis. Take note that the retractor penis muscle covers the corpus spongiosum.

STEP 2

The retractor penis muscle is sharply dissected from the purple corpus spongiosum. The urethra is located within this highly vascular tissue.



STEP 3

A stab incision is initially made in the ventral aspect of the corpus spongiosum and urethra using a No. 11 scalpel blade. A urethrostomy incision is completed with a pair of iris or tenotomy scissors. A continuous suture pattern on each side of the incised urethra (using an absorbable suture such as 5-0 Vicryl) is used to appose the urethral mucosa to the skin.



POSTOPERATIVE CANINE CARE

- Select an oral narcotic and NSAID for postoperative analgesia.
- Prescribe a sedative if excitement causes bleeding at the surgical site.
- Prescribe antibiotics for 14 days based on culture and sensitivity findings or empirical selection.
- Keep Elizabethan collar on dog for 2 weeks.

POSTOPERATIVE FELINE CARE

- Keep Elizabethan collar on cat for 2 weeks.
- Prescribe oral buprenorphine as needed for the treatment of pain.
- Use commercial paper cat litter or shredded paper.
- Prescribe antibiotics for 14 days after surgery (selection based on urine culture and sensitivity results or empirically based).
- Remove nonabsorbable sutures in 10 to 14 days.
- At 2 weeks and 8 weeks after surgery, check the urethrostomy site for patency to determine whether urethral stricture has developed (tip of curved mosquito hemostat should easily insert into the urethral ostium).

See Aids & Resources, back page, for references & suggested reading.