

Anesthesia for the Cat with Urethral Obstruction

Anesthesia is intended to facilitate urethral obstruction relief and placement of an indwelling urethral catheter. These patients are too compromised to tolerate prolonged anesthesia without suffering complications. No other surgical procedures should be undertaken until electrolyte abnormalities, fluid deficits, and azotemia have been resolved.

Urethral catheterization may be accomplished using sacro-coccygeal (caudal) epidural analgesia alone in severe compromised or depressed cats, or in combination with light IV or IM chemical restraint. In addition, urethral spasm relief and catheterization can be facilitated by infiltration of 0.5 mL of 2% lidocaine into the urethra. The urethral mucosa will become desensitized within 2 to 3 minutes.

Patient Evaluation

Evaluate whether the following parameters are mildly, moderately, or severely altered:

- Hydration
- CNS depression
- Heart rate and rhythm (hyperkalemic cats often have inappropriately normal or low heart rates)

Look for the following indicators of hyperkalemia:

- Bradycardia or normal heart rate (should be tachycardic)
- Peaked or tented T waves
- Depression or loss of P wave
- Prolonged QRS complex
- Heart block
- Sine wave configuration

Measure serum potassium. Perform lead-2 ECG if hyperkalemia is suspected.

Premedication

If possible, place an IV catheter without chemical restraint.

If chemical restraint is required, for sacrococcygeal epidural anesthesia and/or urinary catheterization, administer butorphanol 0.1 to 0.2 mg/kg IV adding midazolam 0.05 mg/kg IV if additional relaxation is needed.

If chemical restraint is required for IV catheter placement:

- Alfaxalone 2 mg/kg + butorphanol 0.2 mg/kg + atropine 0.02 mg/kg IM
- Wait 10 minutes before attempting to place IV catheter
- This IM chemical restraint may last long enough to allow IV catheterization as well as sacrococcygeal epidural anesthesia.

Induction/Additional Chemical Restraint

Choose from the following:

- Alfaxalone IV
- Ketamine + diazepam (or midazolam) IV

Deliver oxygen by face mask throughout induction.

Maintenance

Secure a laryngeal mask airway or endotracheal tube and deliver oxygen. You may obtain up to 15 minutes of sleep/work time after IV induction without need for any supplemental anesthesia drugs. These are depressed patients with poor tolerance for inhalant anesthesia, therefore it is wiser to perform a sacrococcygeal epidural early in the urinary catheterization process and thus avoid having to turn the vaporizer on.

If the obstruction is refractory to rapid catheterization and the patient is stable under injectable anesthetic drugs, proceed to low dose inhalant anesthesia with isoflurane or sevoflurane. Be prepared to support blood pressure with dopamine CRI.

Support

Begin aggressive fluid therapy before unblocking if patient is stocky or as soon as urethral obstruction is relieved; LRS, and similar balanced electrolyte solutions are acceptable. Potassium free fluids such as normal saline 0.9% supplemented with 30 mEq of sodium bicarbonate/liter can also be used. However, the concentration of the potassium in IV fluid solutions is not crucial since it is likely much lower than the patient's serum potassium concentration and will have a diluting effect.

Monitoring (regardless of whether or not the vaporizer has been turned on)

- Temperature
- Breathing depth and rate
- Mucous membrane colour
- Non invasive blood pressure measurement
- Heart rate
- Continuous lead-2 ECG

Special Instructions

Aggressive post-obstruction IV fluid and electrolyte therapy is required to avoid delayed recovery, hypokalemia, hypovolemia, and dehydration caused by the predictable post-obstruction diuresis.

Track body weight and fluids-in-fluids-out frequently in the recovery period. in order to be able to adjust fluid delivery rates and total volumes,

Once diuresis is established, serum potassium levels will begin to decrease, trending towards hypokalemia which may require IV supplementation.

Hyperkalemia Associated with Feline Urethral Obstruction

If serum potassium can be measured in-house, then do so at admission. Hyperkalemia above approximately 6.5 mEq/L is associated with cardiac rate and rhythm changes that increase anesthesia risk. Anesthesia and/or chemical restraint is contraindicated until bradycardia and other cardiac rhythm changes are reversed.

Hyperkalemic cats may be so depressed that they tolerate urethral obstruction relief with little or no chemical restraint, and only with urethral lidocaine infusion or sacro coccygeal epidural analgesia.

Treating Hyperkalemia

To be initiated prior to chemical restraint in cats with serum potassium above 7 and/or ECG abnormalities or bradycardia:

Option 1: SQ terbutaline 0.01 mg/kg SQ or IM - will require 20 to 30 minutes for ECG changes to be seen therefore insufficient therapy in cats showing sine wave ecg tracing.

Option 2: Insulin and dextrose

Administer regular insulin 1/4 unit IV.

Administer dextrose 50% at 1–2 mL/kg IV over 5 minutes.

Measure and monitor blood glucose.

Be prepared to initiate glucose infusion.

Option 3: IV calcium gluconate

If there is still no improvement in the ECG trace, or in the presence of a sine wave ecg configuration, administer 10% calcium gluconate 0.5–1.0 mL/kg IV over 5 to 10 minutes.

An improvement in the ecg tracing will be detected within 5 minutes, but will last less than 20 minutes. This is enough time to relieve the urethral obstruction and promote diuresis, which is the definitive means of resolving hyperkalemia.

Sacro-coccygeal Epidural Analgesia in the Cat with Urethral Obstruction

This technique may be used in combination with IV or IM chemical restraint, or as an analgesia supplement to general anesthesia. It will provide up to 24 hours of pain relief—without loss of motor function to hindlimbs—when bupivacaine or lidocaine are combined with morphine or buprenorphine, and delivered epidurally at the sacro-coccygeal space.

See also: [Feline sacro-coccygeal epidural anesthesia technique AAHA](#)

Contraindications

- Coagulopathy
- Sepsis
- Skeletal deformity that hinders identification of bony landmarks
- Neurological impairment
- Pyoderma in sacro-coccygeal area

Patient Restraint and Handling

- Perform the block after effective chemical restraint
- Severely compromised patients may not require any form of chemical restraint

Patient Positioning

Sternal recumbency

Anatomical Landmarks

Move the patient's tail up and down in a gentle pumping motion, while palpating the base of the tail with the index finger of your non-dominant hand. The sacro-coccygeal intervertebral space is between the mobile tail and the immobile sacrum. Identify the area where the mobile tail attaches to the non-mobile pelvis.

Equipment

- Sterile 3 mL syringe
- Sterile preservative-free morphine or buprenorphine (optional)
- Sterile preservative-free lidocaine or bupivacaine
- Sterile gloves
- Supplies for surgical preparation of the skin
- 5/8 inch or 1 inch 25 gauge single-use hypodermic needle

NOTE: In Canada, preservative containing morphine is acceptable, as the preservative is sodium benzoate.

Epidural Injection Technique

1. Aseptically prepare the skin in the sacro-coccygeal area, shaving only sufficient fur to allow aseptic injection (complete hair regrowth is occasionally slow).
2. In long-haired breeds, clip the fur in a way that allows camouflage of the shaved area.
3. Draw up anesthetic agents (local anesthetic drugs and opioids can be combined in the same syringe)
 - 2% lidocaine (2 mg/kg) OR 0.5% bupivacaine (0.5 mg/kg) + optional morphine (0.1 mg/kg) OR optional buprenorphine (3 ug/kg)
4. Wearing sterile gloves, identify the sacro-coccygeal intervertebral space by moving the patient's tail up and down; the sacro-coccygeal space is between the mobile tail and the immobile sacrum. If you are right handed, perform this task with your left hand and vice versa.
5. Insert a 25 gauge 5/8-inch hypodermic needle through the skin at the midline, with the needle at a 45 degree angle to the skin surface. Aim the needle's bevel cranially. Unlike spinal needles, hypodermic needles do not allow you to identify the bevel direction once the needle tip is buried, so you must make note of the bevel direction before advancing the needle through the skin although bevel direction is not crucial.
6. After penetrating through the skin, the needle will face only slight resistance until it encounters the intervertebral ligament. A "pop" may be appreciated as the needle is advanced to the floor of the sacrum, which will feel like a bony structure. Once the bony structure has been encountered, stop any further advancement of the needle.
7. To verify needle placement:
 - The needle should be buried almost to its hub to be through the skin and subcutaneous tissues without encountering bone
 - Connect a syringe to the needle; aspirate to confirm the absence of blood
8. Inject anesthetic agent over 10 seconds using steady pressure; there should be no resistance to injection; if resistance is encountered, try repositioning by pulling the needle out slightly.

Within 5 minutes, the tail flaccidity should be detectable. If first attempt fails, the block can be attempted a second time using the initial drug doses.

Use of epidural lidocaine will provide at least 60 minutes of perineal desensitization, and use of epidural bupivacaine will provide at least 3 hours of numbness. The epidural opioid provides 18–24 hours of additional analgesia after tail motor tone and sensation have returned.

Complications/Adverse Events

This regional block does not typically affect hindlimb motor or sensory function unless repeated attempts are made and involve delivery of a higher than normal volume of local anesthetic. In this case, simply wait a few hours motor function will return.

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