

Top 5 Anesthetic Management Differences Between Dogs & Cats

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When planning for and managing anesthesia in cats and dogs, there are differences beyond size that should be considered.

Following are 5 of the most common key differences in anesthetic management for cats and dogs according to the author.

1 Restraint & Instrumentation

Minimal restraint is frequently most effective in achieving efficiency, which is key when working with cats. Previsit oral medications (eg, gabapentin and trazodone) given at home have been shown to minimize anxiety and stress and increase compliance.¹⁻³ Alfaxalone and dexmedetomidine can also help alleviate agitation; these drugs are typically administered IM after the overall health of the cat has been evaluated.

Because of the small size of cats, IV catheterization can be more challenging in cats than in dogs. Although the cephalic vein can be catheterized in both cats and dogs, the medial saphenous vein is more commonly catheterized in cats, and the lateral saphenous vein is more commonly catheterized in dogs. Intubation can also be more challenging in cats because of the size and reactivity of

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1. Restraint & Instrumentation
2. Anesthetic Equipment
3. Medications & Patient Response
4. Monitoring
5. Support

the upper airway. If care is not used, a greater incidence of tracheal tears following intubation is possible^{4,5}; however, use of topical lidocaine on the arytenoids and an appropriate tube without a stiff stylet can greatly minimize these problems. Diligent cuff inflation and disconnection of the tube from the breathing circuit are also important when turning the patient.

Postanesthesia, cortical blindness also has been reported in cats (but not in dogs) and associated with the influence of spring-loaded mouth gags on maxillary artery blood flow^{6,7}; therefore, it is important that use of these devices be minimized or avoided when anesthetizing cats for bronchoscopy, endoscopy, or dentistry.

2 Anesthetic Equipment

A nonbreathing circuit (eg, Bain) is commonly used to anesthetize cats weighing <11 lb (5 kg). These circuits must be appropriately assembled and used in order to minimize complications, including excessive pressure in the system. A nonbreathing system also requires higher flow rates on a per-kilogram basis to minimize rebreathing of carbon dioxide, which can dry the respiratory tract and increase patient cooling. Although not routinely used during anesthetic management, there are tools that can help alleviate these concerns by heating and humidifying the breathing system. Pediatric circle systems can be used in cats, but inspiratory and expiratory

valves and carbon dioxide absorbent increases the work required for breathing in spontaneously ventilating animals, possibly resulting in fatigue and hypoventilation.

Similar considerations relative to breathing circuits exist for small dogs. Larger dogs can typically be maintained on circle breathing systems with appropriately sized hoses and rebreathing bags.

3 Medications & Patient Response

Cats differ in their requirements for and responses to numerous medications commonly used in the perianesthetic period. Acepromazine is considered an effective tranquilizer in dogs, particularly when used in combination with other drugs, but equivalent acepromazine-associated tranquilization in cats may not result, despite signs suggesting efficacy (eg, a raised third eyelid). Conversely, dexmedetomidine provides good sedation in both dogs and cats. The anesthetic induction dose needed to facilitate intubation is lower following dexmedetomidine premedication than with acepromazine.⁸

Opioids are reported to cause a higher degree of signs of euphoria or dysphoria in cats than in dogs, especially with IV administration.⁹ The analgesic- and inhalant-sparing effects in cats also differ from those in dogs, and a ceiling effect (ie, increased dose does not result in additional clinical benefits) may occur at a lower dose.¹⁰ Unlike in dogs, large or repeated doses of opioids may result in hyperthermia in cats.¹¹ The cause of hyperthermia is unknown. Elevations in body temperature are not typically reported in dogs, even when panting is observed following administration. Opioid-associated sedation may contribute to lack of hyperthermia in dogs.

Lidocaine given IV with a bolus or constant-rate infusion has been increasingly used in dogs for its anesthesia-sparing effects and possible analgesic

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benefits. However, IV lidocaine is not routinely recommended in cats because the associated cardiovascular depression is worse than an equivalent dose of inhalant, and drug-related toxicity is possible.¹² When comparing isoflurane requirements, the minimum alveolar concentration is higher in cats than in dogs.¹³

4 Monitoring

Cardiovascular and respiratory monitoring can be challenging in cats because of their size and limitations with monitoring equipment not specifically developed for use in cats. For example, many oscillometric noninvasive blood pressure monitors provide only intermittent readings in cats, and obtaining a reliable signal from a Doppler crystal can be difficult. These obstacles can be further complicated by the use of certain drugs (eg, dexmedetomidine) that cause vasoconstriction, bradycardia, and decreased cardiac output. Similar challenges can occur with the use of a pulse oximeter to monitor oxygen saturation. Amplitude of the electrocardiogram may also hinder accurate heart rate measurement and assessment of rhythm changes in cats as compared with dogs. Typically, cats have higher heart rates than dogs, but their blood pressure during anesthesia tends to be more labile or stimulus-responsive. It is therefore important to evaluate physiologic monitors to be used during anesthesia in the clinic to ensure functionality. In addition, using an appropriately sized Doppler crystal or an alternate site (eg, tail vs distal limb) may help improve performance. Similarly, for pulse oximeter probes, placement of a moist gauze sponge over the tongue prior to probe placement can be beneficial.

When a nonrebreathing system is used, side-stream capnography can result in significant underestimation of the end-tidal carbon dioxide tension because of the constant flow of oxygen diluting exhaled gas at the sampling site. A mainstream capnometer can alleviate this issue, but

weight on the endotracheal tube can cause kinking or dislodging.

Pain assessment in cats is also more difficult and requires close observation of specific behaviors and interaction with the patient as needed.¹⁴ There are an increasing number of pain scales and assessment tools available.

5 Support

Fluid therapy during anesthesia is critical for maintaining blood pressure and vital organ perfusion during anesthesia in cats and dogs. Because older cats are frequently diagnosed with varying stages of renal disease, fluid support is essential in the perianesthetic period.¹⁵ To account for blood volume differences (ie, ~60-70 mL/kg in cats vs ~80-90 mL/kg in dogs), the volume of both fluids and blood products should be lowered for cats, especially when administered via bolus. Because universal feline donors do not exist, all cats, including naive cats, should be typed and crossmatched to donors in cases in which use of blood products is anticipated.

Conclusion

Although anesthesia in cats is often thought to be more challenging than in dogs, knowledge of species-specific requirements and responses can help improve patient management during the perianesthetic period. ■

All cats should be typed and crossmatched to donors in cases in which use of blood products is anticipated.

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Semintra® (telmisartan oral solution) 10 mg/mL

For oral use in cats only
Angiotensin II Receptor Blocker

Brief Summary: Before using SEMINTRA, please consult the product insert, a summary of which follows:

Caution: Federal law restricts this drug to use by or on the order of a licensed veterinarian.

Description: SEMINTRA (telmisartan oral solution) is a clear, colorless to yellowish viscous solution containing 10 mg/mL telmisartan.

Indication and Usage: SEMINTRA is indicated for the control of systemic hypertension in cats. The initial dose of SEMINTRA is 1.5 mg/kg (0.68 mg/lb) orally twice daily for 14 days, followed by 2 mg/kg (0.91 mg/lb) orally once daily. The dose may be reduced by 0.5 mg/kg (0.23 mg/lb) increments to a minimum of 0.5 mg/kg (0.23 mg/lb) orally once daily to manage SEMINTRA-induced hypotension. SEMINTRA can be administered directly into the mouth, or next to or on top of a small amount of food. Do not mix into food.

SEMINTRA should be administered using the dosing syringe provided in the package. The dosing syringe fits onto the bottle and has 0.1 mL incremental marks. The dose should be rounded to the nearest 0.1 mL. After administration close the bottle tightly with the cap. Rinse the dosing syringe with water and let air dry.

If the cat vomits within 30 minutes of dosing, the cat may be re-dosed.

Information for Cat Owners: Adverse reactions can occur with use of SEMINTRA. The most common adverse reactions reported during the field studies included vomiting, diarrhea, lethargy, weight loss, anemia, and dehydration.

Contraindications: Do not use in cats with a hypersensitivity to telmisartan.

Human Warnings: Not for human use. Keep out of reach of children.

SEMINTRA is an angiotensin II antagonist/angiotensin receptor blocker (ARB). Pregnant women should avoid contact with SEMINTRA because substances that act on the renin-angiotensin-aldosterone system (RAAS) such as angiotensin receptor blockers (ARBs) can cause fetal and neonatal morbidity and death during pregnancy in humans.

Precautions: SEMINTRA can cause mild anemia or non-regenerative anemia. Cats should be monitored for anemia when initiating treatment with SEMINTRA.

SEMINTRA may cause inappetence and weight loss in some cats. Cats should be monitored for weight loss when initiating treatment with SEMINTRA. Use with caution in cats with a history of vomiting, inappetence, or weight loss.

SEMINTRA has not been evaluated in cats with systolic blood pressure >200 mmHg.

The safe use of SEMINTRA in cats with hepatic disease has not been evaluated. SEMINTRA is metabolized by the liver.

The safe use of SEMINTRA has not been evaluated in cats less than 9 months of age, or in cats that are pregnant, lactating, or intended for breeding. **See Human Warnings.**

The safe use with other anti-hypertensive medications has not been evaluated.

Adverse Reactions: The safety of SEMINTRA was evaluated in a 28-day field study in 192 cats.

Adverse reactions that occurred include vomiting 46 (24.0%), diarrhea 18 (9.4%), lethargy 13 (6.8%), weight loss 13 (6.8%), decreased appetite/inappetence 13 (6.8%), non-regenerative anemia 11 (5.7%), dehydration 10 (5.2%), retinal lesions (target organ damage) 4 (2.1%).

The long-term safety of SEMINTRA was evaluated in an open-label, 5-month field effectiveness and safety study in 107 cats that received at least one dose of SEMINTRA. Adverse reactions that occurred in this study are weight loss 37 (34.6%), vomiting 32 (29.9%), dehydration 18 (16.8%), non-regenerative anemia 17 (15.8%), anorexia 14 (13.1%), diarrhea 12 (11.2%), lethargy 12 (11.2%), decreased appetite/inappetence 11 (10.3%), heart murmur 10 (9.3%), death, euthanasia, found dead 9 (8.4%), cough 8 (7.5%), and retinal lesions (target organ damage) 6 (5.6%).

Nine cats died or were euthanized during the study. Three cats had progressive chronic kidney disease that may have been affected by telmisartan treatment, concurrent disease, or inadequate control of hypertension. The other six cats died of causes unrelated to treatment (e.g. neoplasia).

To report suspected adverse drug events, for technical assistance, or to obtain a copy of the Safety Data Sheet (SDS), contact Boehringer Ingelheim Vetmedica, Inc. at 1-866-638-2226. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or at <http://www.fda.gov/AnimalVeterinary/SafetyHealth>.

Effectiveness: Effectiveness was demonstrated in a 28-day multi-center, controlled, randomized and masked field study in client-owned cats with hypertension, and in an open-label 5-month field study.

28-Day Field Study

In a 28-day study, 288 cats with hypertension (systolic blood pressure [SBP] 160-200 mmHg) were enrolled in the study and randomized to treatment with SEMINTRA (telmisartan oral solution) (n=192) or vehicle control (n=96). The study population included cats with hypertension associated with chronic kidney disease or controlled hyperthyroidism, or idiopathic hypertension. The per protocol population for effectiveness was 141 SEMINTRA treated cats and 79 control cats. SEMINTRA was administered orally at 1.5 mg/kg twice daily for 14 days, then 2 mg/kg once daily until study end; the vehicle control was administered at a mL/kg volume equivalent to SEMINTRA. The two primary variables for effectiveness were comparison of the SEMINTRA and control group mean SBP (mSBP) from baseline to Day 14, and a decrease in mSBP >20 mmHg in the SEMINTRA group from baseline to Day 28. Cats with SBP >180 mmHg at Days 14 or 28 were rescued and removed from the study. There was a statistically significant difference between the mSBP for the SEMINTRA group compared to the control group at Day 14 (p=0.0005). At Day 14 the SEMINTRA group mSBP decreased by 23.2 mmHg, and the control group mSBP decreased by 7.3 mmHg. At Day 28, the SEMINTRA group mSBP decreased 23.9 mmHg compared to baseline.

5-Month Field Study

One hundred-seventy-seven cats from the SEMINTRA group that had successfully completed the 28-day study were enrolled in a 5-month open-label study. At the beginning of the 5-month study most cats were administered SEMINTRA at 2 mg/kg once daily. Cats that experienced hypotension (defined as SBP <120 mmHg) at 2 mg/kg once daily could have the SEMINTRA dose reduced to 1 mg/kg once daily. Cats that experienced hypotension at 1 mg/kg once daily could have the SEMINTRA dose reduced again to 0.5 mg/kg once daily. Cats were evaluated for SBP, target organ damage (TOD; primarily assessed by retinal photographs), clinical pathology and adverse reactions. SBP was measured on Days 28, 56, 98, 140 and 182 and retinal photographs and clinical pathology were collected on Days 28, 98 and 182. Seventy-three (68.2%) cats completed the study (Day 182), 8 cats were removed for hypertension (SBP >180 mmHg), 2 cats were removed for hypotension, 10 cats were removed by the owner or for owner non-compliance, 8 cats were removed for new or worsening TOD, and 6 cats were removed for adverse reactions unrelated to TOD. Twenty-six cats had dose reductions to 1 mg/kg once daily to manage hypotension. Of these 26 cats, 10 had an additional dose reduction to 0.5 mg/kg once daily.

NADA 141-501, Approved by FDA

Manufactured for:

Boehringer Ingelheim Vetmedica, Inc.
St. Joseph, MO 64506, U.S.A.

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