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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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 nonrebreathing 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 nonrebreathing 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.

Opioid-associated sedation may contribute to lack of hyperthermia in dogs.

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

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, sidestream 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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References

1. van Haafften KA, Forsythe LRE, Stelow EA, Bain MJ. Effects of a single preappointment dose of gabapentin on signs of stress in cats during transportation and veterinary examination. *J Am Vet Med Assoc*. 2017:251(10):1175-1181.
2. Orlando JM, Case BC, Thomson AE, Griffith E, Sherman BL. Use of oral trazodone for sedation in cats: a pilot study. *J Feline Med Surg*. 2016;18(6):476-482.
3. Stevens BJ, Frantz EM, Orlando JM, et al. Efficacy of a single dose of trazodone hydrochloride given to cats prior to veterinary visits to reduce signs of transport- and examination-related anxiety. *J Am Vet Med Assoc*. 2016;249(2):202-207.
4. Quandt JE. Postintubation tracheal tears in cats. *Clinician's Brief*. 2017;15(6):29-32, 92.
5. Mitchell SL, McCarthy R, Rudloff E, Pernell RT. Tracheal rupture associated with intubation in cats: 20 cases (1996-1998). *J Am Vet Med Assoc*. 2000;216(10):1592-1595.
6. Stiles J, Weil AB, Packer RA, Lantz GC. Post-anesthetic cortical blindness in cats: twenty cases. *Vet J*. 2012;193(2):367-373.
7. Martin-Flores M, Scivani PV, Loew E, Gleed CA, Ludders JW. Maximal and submaximal mouth opening with mouth gags in cats: implications for maxillary artery blood flow. *Vet J*. 2014;200(1):60-64.
8. Hunt JR, Grint NJ, Taylor PM, Murrell JC. Sedative and analgesic effects of buprenorphine, combined with either acepromazine or dexmedetomidine, for premedication prior to elective surgery in cats and dogs. *Vet Anaesth Analg*. 2013;40(3):297-307.
9. Kamata M, Nagahama S, Kakishima K, Sasaki N, Nishimura R. Comparison of behavioral effects of morphine and fentanyl in dogs and cats. *J Vet Med Sci*. 2012;74(2):231-234.
10. Ferreira TH, Steffey EP, Mama KR, Rezende ML, Aguiar AJA. Determination of the sevoflurane sparing effect of methadone in cats. *Vet Anaesth Analg*. 2011;38(4):310-319.
11. Posner LP, Pavuk AA, Roshkar JL, Carter JE, Levine JF. Effects of opioids and anesthetic drugs on body temperature in cats. *Vet Anaesth Analg*. 2010;37(1):35-43.
12. Pypendop BH, Ilkiw JE. Assessment of the hemodynamic effects of lidocaine administered IV in isoflurane-anesthetized cats. *Am J Vet Res*. 2005;66(4):661-668.
13. Steffey EP, Howland D Jr. Isoflurane potency in the dog and cat. *Am J Vet Res*. 1977;38(11):1833-1836.
14. Merola I, Mills DS. Behavioural signs of pain in cats: an expert consensus. *PLoS One*. 2016;11(2):e0150040.
15. Grauer GF. Treatment guidelines for chronic kidney disease in dogs & cats: International Renal Interest Society recommendations. *Today's Veterinary Practice*. 2017;7(1):41-53.