



METROPOLITAN VETERINARY ASSOCIATES NEWSLETTER

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IN THIS NEWSLETTER, A FOCUS ON ANESTHESIA

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BRACHYCEPHALIC BREEDS

Brachycephalic breeds, including Pugs, French bulldogs, English bulldogs, American bulldogs, and Boston Terriers, can be some of the most difficult animals to anesthetize and present unique challenges that do not exist amongst other breeds. This article will discuss the anatomic and physiologic differences that can affect the outcome of anesthesia and ways to deal with these differences.

Brachycephalic dogs have anatomic considerations that may affect anesthetic outcome.¹ Many brachycephalic breeds suffer from brachycephalic airway syndrome (BAS) which includes the presence of stenotic nares, elongated soft palate, everted laryngeal sacculles, and hypoplastic trachea and have narrower and smaller upper airways than dogs with a normal anatomy.^{2,3,4} These narrow airways increase resistance and the work of breathing. This becomes particularly important during times of stress when the respiratory rate increases and the flow becomes turbulent, further increasing the work of breathing. It is important when anesthetizing a brachycephalic dog

to be prepared at all times for upper airway obstruction. These dogs must be monitored closely after premedication, throughout anesthesia, into the post-operative period, and after extubation into the recovery period. An oxygen source and endotracheal tube should always be readily available, even after extubation. Regurgitation or reflux is always a concern when sedating or anesthetizing brachycephalic dogs and one should be prepared if this should happen. Preventative measures should be taken with all brachycephalic dogs undergoing sedation or anesthesia, although these measures have not been shown definitively to reduce regurgitation. Steps that can be taken in attempts to prevent regurgitation include adding metoclopramide to the premedication, administration of cerenia at least one hour prior to premedication, and the addition of other centrally acting antiemetics such as dolasetron or ondansetron to the protocol. Although these additions have not been shown to reliably reduce regurgitation they do reduce nausea and vomiting associated with drugs and anesthesia and this ultimately will



Dr. Stephanie Krein

lead to a better anesthetic experience for both the dog and their owner.

Designing the perfect anesthetic protocol for brachycephalic dogs can be difficult to say the least. The proper sedation should allow the patient to breathe slowly and calmly without causing excessive respiratory depression. Many brachycephalic dogs respond well to sedatives such as acepromazine or dexmedetomidine in conjunction with an opioid, but the



sedative dose should be half of what is used in the non-brachycephalic dog. Full mu opioids can be utilized but may cause excessive respiratory depression so a reversal agent should be available. Butorphanol, a kappa agonist and mu antagonist opioid, can be used and provides reliable sedation but short acting analgesia. Buprenorphine, a partial mu agonist, provides moderate analgesia and minimal sedation and can also be used as part of the premedication. Dexmedetomidine, an alpha-2 agonist, may be used in these dogs if no cardiovascular disease exists but due to the presence of high vagal tone the dose used should be reduced. Dexmedetomidine when used in lower doses provides good sedation, is fully reversible, and provides analgesia.⁶ Acepromazine, a phenothiazide sedative, is commonly used in many brachycephalic breeds due to its anxiolytic properties. Acepromazine provides reliable sedation in these dogs but is not reversible so should be used in low doses. There are several websites stating that acepromazine cannot be used in French bulldogs but these websites are not backed by any reliable scientific evidence or studies and should be followed with caution. In fact, French bulldogs are

often highly stressed and excited when presenting for anesthesia and can actually benefit from the addition of acepromazine to the protocol. The goal of premedication in brachycephalic dogs is to provide enough sedation and anxiolysis to allow intravenous catheter placement with minimal stress.

The induction agent chosen should allow for smooth rapid induction and intubation thereby protecting the airway and providing a source of oxygen as quickly as possible. The induction agent should also allow for rapid loss of consciousness and rapid return of consciousness. There are several induction agents that can be chosen including propofol or alfaxalone. Preoxygenation is always recommended before induction of dogs with BAS.^{3, 4, 5} Intubation should be performed as rapidly as possible and mask inductions should be avoided.^{4, 5} Due to the everted laryngeal sacculles and small tracheal size, most BAS breeds require a smaller size endotracheal tube than would be expected for a patient of the same weight so it is important to have a large variety of sizes of endotracheal tubes available during induction.⁷ Due to the common occurrence of

obesity in brachycephalic breeds, controlled or mechanical ventilation is often necessary. It is not uncommon for regurgitation to occur during the induction period and it is of good practice to have active suction available for rapid suction of the airway. The intra-operative period is usually similar to that of other breeds, although if surgery is to be performed on the airway itself it may be indicated to administer an injectable steroid such as dexamethasone to reduce post-operative swelling.

Most problems occur during the induction and recovery periods and this is a particular problem in the recovery period when patients are poorly monitored. It is important to postpone extubation until the patient is bright, alert, swallowing, and even chewing on the endotracheal tube.⁵ If extubation is attempted while the patient is sedate and groggy from anesthesia there is an increased risk for upper airway obstruction. If an upper airway obstruction does occur, the patient may need to be reintubated so extra laryngoscopes, induction agent, and tubes should be available. Once extubation occurs the patient should be observed for breath sounds and signs of obstruction such as

inflation of the abdomen with collapse of the thorax on inspiration and lack of breath sounds. The patient should be placed in sternal recumbency during recovery and pulse oximetry should be monitored as long as possible. The airway may also be opened by extending the head, opening the mouth and pulling out the tongue of the patient. It is often enough just to prop up the head of the patient maintaining a patent airway while they are still groggy. If reversible sedatives were used then the antagonist can be given to try and lessen the

sedation levels. Once the patient is taking good breaths and awake they should be monitored closely for the next few hours. Brachycephalic patients should never be left alone in the recovery period. The key to a successful anesthetic recovery is a calm, comfortable patient and a calm, prepared anesthetist. Although sedation and anesthesia of BAS patients can be difficult and stressful, with proper precautionary steps and drug choice it can be done safely and successfully. 🐾

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SPECIALIZED SERVICES

ANESTHESIA

Jeremy Hansford, DVM, MS, DACVAA
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Risa Roland, DVM, DACVIM (Cardiology)

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Jacqui Niles, BVETMED, SAS, DACVS
Catherine Popovitch, DVM, DACVS, DECVS
Timothy M. Schwab, VMD, DACVS-SA
Rebecca Wolf, VMD, DACVS-SA

NOCITA

Perioperative analgesia has become recognized as one of the most important parts of providing superior care for dogs and cats before and after surgical procedures. The mainstays of perioperative analgesia include opioids, alpha-2 agonists, ketamine, NSAIDs, and local anesthetics. Each of these drug classes, while providing pain relief, also present their own unique side effects and affect each patient differently. Opioids, for example, are the most commonly used analgesic drugs in veterinary medicine due to their superior safety profile and excellent analgesic properties but are fraught with adverse effects such as dysphoria, vomiting, ileus, nausea, and regurgitation. Local anesthetic drugs, such as bupivacaine and lidocaine, are unique in that they can be used locoregionally instead of systemically, thereby providing analgesia while minimizing side effects. Local anesthetics work by blocking sodium channels along nerves inhibiting excitation and blocking conduction and nerve transmission. Local anesthetics have both a peripheral effect on the nociceptors at the site of injury as well as a central effect in the spinal cord. They not only act on nociceptors but also on vascular smooth muscle, nerves, and the heart. Local anesthetics can be administered via several routes, including topical application, spinal anesthesia, epidural injection, intravenous infusion, and regionally by nerve blocks. Many consider local anesthetics to be the only true analgesic due to the fact that they provide pre-emptive analgesia by actually blocking pain transmission vs the treatment of pain after it occurs.

Recently NOCITA, bupivacaine liposome injectable suspension, was introduced into the veterinary market by Aratana Therapeutics. This novel therapeutic is approved for use in dogs undergoing stifle surgery and intended to provide 72 hours of post-operative pain relief. It is labeled for single dose administration and use within 4 hours. NOCITA acts by releasing the local anesthetic

bupivacaine slowly over 72 hours from the injection site. The liposomal technology, named DepoFoam bupivacaine, has been used with much success in human medicine since 2011.¹ DepoFoam technology involves multivesicular liposomes that encapsulate aqueous bupivacaine. The liposomes are made up of nonconcentric lipid bilayers and as these bilayers are broken down by enzymes the bupivacaine is gradually released over 72 hours (**Figure 1**).

2 During the FDA approval of DepoFoam, liposomal bupivacaine was extensively studied in dogs and was found to be well tolerated and have an acceptable safety profile.^{3,4}

NOCITA is administered by the surgeon at the site of surgery using the moving needle technique (**Figure 2**).⁵ Once the bupivacaine is released from the liposome after the lipid bilayers are broken down, its pharmacokinetics and pharmacodynamics are expected to be similar to bupivacaine HCL.⁶ Bupivacaine elimination depends largely on binding to plasma proteins in systemic circulation and hepatic metabolism. Excretion of bupivacaine is mainly performed by the kidneys. In patients with marked hepatic disease or dysfunction, NOCITA should be used with caution as they may be more prone to toxicities of local anesthetics such as seizures, tremors, or circulatory collapse. Many surgeons worry about delayed wound healing with local anesthetics but studies have shown this not to be a problem with the use of NOCITA.⁷ Another

study showed that local irritation or tissue damage was mild with the use of liposomal bupivacaine, but that swollen or thickened injection sites can be seen.⁸ Overall it seems that the adverse effects noted with the use of NOCITA are minimal in comparison to the excellent analgesia provided by the drug.

Although at this time NOCITA is approved only for use in dogs undergoing stifle surgery and cats undergoing declaw procedures, it is widely being used by anesthesiologists and surgeons for various types of procedures such as thoracotomies, limb amputations, hemilaminectomies, abdominal explores, soft tissue mass removals, and more. In procedures such as amputations, prior to the use of NOCITA, diffusion catheters were placed at the surgical site allowing infusion of local anesthetic to provide post-operative analgesia for 24 hours. Adverse effects of diffusion catheters included seroma formation, irritation at the catheter site, infection at the site, or accidental intravascular injection. The use of NOCITA has allowed us to deposit local anesthetic at the surgical site without the adverse effects noted with the catheter use. Subjectively, patients receiving NOCITA have seemed very comfortable and have required fewer systemic analgesics. It is of the author's opinion that these patients also seem to eat sooner after the procedure and are more mobile than the patients prior to the use of NOCITA. Other procedures in which

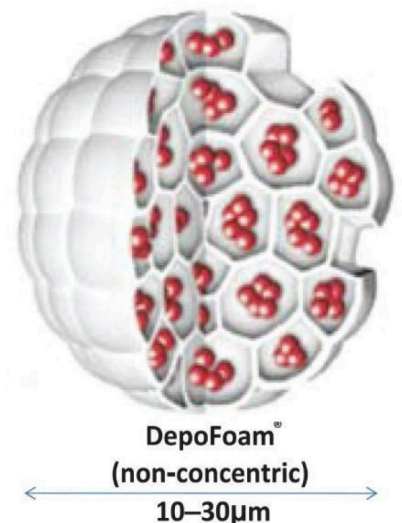
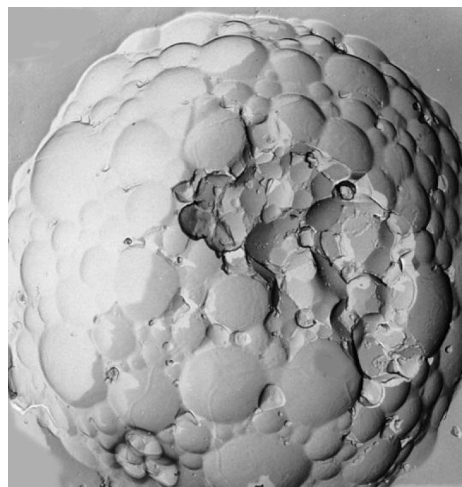


Figure 1. Microscopic structure of a liposome.

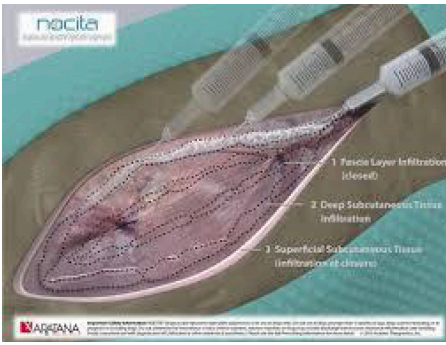


Figure 2. The moving needle technique

NOCITA has been used off label at our institution include mastectomies, mass removals, or fracture repairs in both dogs and cats.

The introduction of NOCITA into the veterinary market has allowed us to greatly improve how we provide post-operative analgesia to our patients. Unlike locoregional anesthesia techniques, including epidurals or peripheral nerve blocks, the

proper use of NOCITA can be easily learned and used by all practitioners. Although on the more expensive side, the benefits of adding NOCITA to a practice's arsenal of available analgesic drugs will greatly outweigh the costs when it comes to patient comfort and client satisfaction. Hopefully in the future, the label use of NOCITA will be expanded for use in both dogs and cats and in many different surgical procedures. 🐾

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INTRODUCING JEREMY HANSFORD, DVM, MS, DACVAA, JOINING OUR ANESTHESIA TEAM THIS OCTOBER

Dr. Jeremy Hansford received his veterinary degree from the University of Georgia in 2012, and his Master's Degree in Biomedical and Veterinary Sciences from Virginia-Maryland College of Veterinary Medicine in 2021. He became board certified by the American College of Veterinary Anesthesia and Analgesia in 2021.

We're thrilled to have Dr. Hansford join MVA's Anesthesia Team as of October, 2022. 🐾

RECOVER TRAINING



Jessi Moodey, BS, CVT

AVAILABLE TO YOUR TEAM STARTING IN SEPTEMBER

RECOVER Initiative CPR training in your hospital.

Our ICU/ES Nurse, Jessi Moodey, BS, CVT, would love to come to your hospital and do a presentation followed by hands-on CPR training as per the RECOVER Initiative. This training course takes an hour and a half on average and is packed full of useful information and tips.

- RECOVER Initiative CPR Refresher presentation
- CPR practice with Jerry the mannequin
- Q & A

If you are interested in scheduling a day of training for your team, please contact Sarah Spurgeon at sspurgeon@metro-vet.com or 610-666-6317.

WELCOMING NEW SPECIALISTS TO OUR MVA TEAM!

Along with Dr. Jeremy Hansford (see page 5), we're so pleased to announce the following specialists will be joining MVA this year:

In August (8/9/22), John Litterine-Kaufman, VMD, DACVS-SA, joins our Surgery Team.

In October (10/3/22), Dominique Sawyere, BVSc, MS, DACVS-SA, also joins our Surgery Team.

We'll send out reminder announcements including their full bios at their start dates, or please reach out to our Hospital Director with any questions — Stacey Connell, sconnell@metro-vet.com.



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