

Anesthesia for canine dentistry and oral surgery

By Nancy Brock, DVM, Dip ACVA

Those of you working in private general practice know that dental procedures are some of the most frequent procedures requiring canine anesthesia. And they represent a significant source of income for small animal practices. So, it's worth investing the time and energy in establishing dental anesthesia standard operating procedures (SOP) that are robust enough to ensure a positive outcome for every patient and minimize the incidence of adverse events. Think of a patient that leaves your hospital after a successful (i.e. uneventful) dental surgery as a walking advertisement for your practice's high quality care.

A robust dental anesthesia SOP needs to effectively address the unique challenges that dental surgery presents, such as:

- 1) Prolonged duration of anesthesia, sometimes unexpectedly
- 2) Aged patients with concurrent diseases
- 3) Oral pain

I believe that all patients undergoing dental procedures should be anesthetized with an endotracheal tube (ETT) secured in place to ensure a patent airway and prevent aspiration. This is a contentious issue that is currently being debated within the veterinary community. See www.avdc.org/dentalscaling.html.

For a brief period, after the introduction of medetomidine as a veterinary sedative, I attempted to provide dental cleaning and oral radiography using sedation only. I quickly abandoned this practice as it presented too high a risk of injury to the dentist and the patient.

The instructions that follow address the special anesthesia and analgesia challenges associated with canine dental procedures.

Pre-anesthesia evaluation: Whenever possible, evaluate the extent of oral pathology in order to anticipate the degree of post-operative pain and the duration of anesthesia. You'll need to be flexible though, as the full extent of oral pathology is often not determined until the patient is under anesthesia and dental radiographs have been performed.

Be cautious about scheduling anesthesia and dentistry for a dog that is anorexic and losing weight. Weight loss and even anorexia are rarely caused by dental pain. So, it's wise to look for another explanation for such symptoms before proceeding. A full investigation of the patient's underlying health is highly recommended to avoid post-operative complications and poor recovery.

Anticipated problems: The following potential problems are associated with all anesthesia delivery: 1) hypotension, 2) hypoventilation, 3) hypothermia and 4) hypoxemia. Depending on the patient's health status, duration of the procedure, support and the anesthesia drug protocol selected, these problems may be mild, moderate or severe. In addition, problems that are particular to dental/oral surgery need to be considered and planned for:

- 1) Tracheal and pharyngeal trauma due to repeated endotracheal tube motion
- 2) Post-extubation airway spasm and obstruction as a result of pharyngeal trauma and fluid accumulation
- 3) Tracheal aspiration of fluid and solid material
- 4) Post-operative pain
- 5) Excess bleeding during maxillary tumour resection and
- 6) Venous air embolism during use of dental drills.

Premedication: All patients undergoing general anesthesia benefit from premedication. Choose from among the following to facilitate IV catheter placement and handling:

Acepromazine 0.05 mg/kg + butorphanol 0.2 mg/kg IM

Acepromazine 0.05 mg/kg + meperidine 4.0 mg/kg IM

Acepromazine 0.05 mg/kg + oxymorphone 0.05 mg/kg IM Note: Higher risk of vomiting

Acepromazine 0.05 mg/kg + hydromorphone 0.05 mg/kg IM Note: Higher risk of vomiting

(Dex)medetomidine 5 ug/kg IM can be substituted for acepromazine to achieve heavier chemical restraint.

If an IV catheter can easily be placed without chemical restraint, consider butorphanol 0.1 mg/kg + midazolam 0.1 mg/kg IV.

Add atropine 0.02 mg/kg **OR** glycopyrrolate 0.01 mg/kg IM to the above protocols except when (dex)medetomidine sedation is chosen.

Notice how the premedication options above do not contain anything to address pain. That is by design. Patients undergoing dental surgery are rarely in acute pain unless they have suffered a head injury. The purpose of premedication is to calm the patient and facilitate handling. Pain control comes afterward, once the patient is under anesthesia and can undergo dental nerve blocks. Opioids that are excellent analgesics are unfortunately poor premedication choices when the goal is to calm a patient.

Induction: Choose from the following:

IV Alfaxan

IV pentothal

IV propofol



IV ketamine + diazepam – preferred if intra-operative ketamine constant rate infusion (CRI) is planned

IV propofol + ketamine – preferred if intra-operative ketamine CRI is planned

Mask induction presents no safety advantage compared to IV anesthetic induction. I discourage its use as it is resented by most patients especially those with facial or oral discomfort and exposes the anesthetist to unacceptable levels of waste anesthetic gas.

Maintenance: Deliver sevoflurane or isoflurane by endotracheal tube. For maxillary resection, and anytime you are unhappy with the level of analgesia provided by dental nerve blocks, supplement inhalant anesthesia with your choice of opioid ketamine CRI or a combination of the two.

Monitoring: Part of the power of SOPs is that they instill a series of steps that ultimately become routine, ensuring that certain aspects of patient care are not accidentally omitted. In addition to a trained and attentive anesthetist, below are my standard monitoring SOPs:

- **Blood pressure** with either an oscillometric or Doppler-based monitor
- **Temperature** - either nasal or esophageal - you might be surprised at just how quickly and profoundly your patients become hypothermic
- **Heart rate and rhythm** via some form of continuous audio (ECG, pulse oximeter, Doppler sound) so that you don't miss an episode of sudden bradycardia associated with vagal stimulation during dental manipulations. I also place an esophageal stethoscope before the other monitors are operational and as a back-up in case the audio disappears unexpectedly.
- **Respiratory rate and rhythm** - this requires keen powers of observation and a thorough knowledge of what is normal and what is abnormal when it comes to breathing patterns
- **Verifying an intact ETT cuff seal** by intermittently delivering a breath and listening for gas escaping around the mouth
- **Blood loss assessment** - keep a close eye on the amount of blood loss during maxillary surgery

Support: Sometimes a patient needs to remain under anesthesia for longer than anticipated as a result of extensive dental pathology or difficulties with extractions. It is never a "bad" decision to complete the dental surgery in two separate visits. However, if a healthy patient is properly supported so that monitoring trends demonstrate a pattern of stable vital signs, this patient can remain under anesthesia for many hours. My record is 7.5 hours of anesthesia for a patient undergoing problematic dental surgery. The patient was well supported and monitored so that we were able to ascertain that vital signs were within normal limits and stable. What kind of support is required to provide these working conditions for the dentist?

Heat supplementation to prevent hypothermia – ensure that the heat source has a thermostat and does not come in direct contact with the patient. Thermostats can fail though, so it is important to run your hands between the heat source and the patient to ensure that the proper amount of heat is being delivered. Accidental patient burning is painful and avoidable. It is also deleterious to a practice's reputation. The accidental burns that I have heard of have involved some or all of the following circumstances:

- 1) failure or absence of a thermostat
- 2) direct contact between the patient at the heat source
- 3) prolonged contact with the heat source and
- 4) wet fur.

IV fluid therapy should continue throughout the entire period of anesthesia but at a tapering rate to avoid iatrogenic fluid overload in the event of a prolonged surgical period. AAHA has recently published their fluid therapy recommendations: https://www.aahanet.org/PublicDocuments/Fluid_Therapy_Guidelines.pdf

The guidelines are well thought out and discourage a one-size-fits-all for fluid therapy during anesthesia. The hourly crystalloid fluid rate for dogs under anesthesia is 5 mL/kg/hour to be reduced during longer periods of anesthesia. Crystalloid alternatives are suggested when hypotension is refractory to fluid therapy.



Special instructions to avoid anesthesia-related complications:

- Avoid harsh movement of the ETT during patient positioning.
- When changing the patient's position, temporarily disconnect the ETT from the breathing circuit. This prevents tracheal trauma and accidental kinking of the ETT.
- Minimize the number of times you turn a patient over from side to side. I have a "1 flip" rule that I enforce in order to avoid hypotension that can occur when a patient is repositioned side to side.
- At the end of a dental procedure, while the patient is still unconscious, inspect the caudal pharynx with a bright light source to detect and remove particulate and fluid material from the throat before extubation.
- If you are concerned that material has traveled down the trachea, remove the ETT with the cuff partially inflated.

Post-dentistry analgesia:

A few recommendations to maximize your success with dental nerve blocks:

- Perform dental blocks with bupivacaine prior to all extractions.
- Time the dental nerve block placement so that at least 5 and preferably 10 minutes elapse before surgical manipulation starts. Placing a nerve block and then performing non-painful manipulations such as dental radiographs, charting or cleaning is a way to use up some of the time required for bupivacaine's onset of effect.
- Do not dilute bupivacaine with lidocaine or saline as this will delay the onset and shorten the duration of the analgesia.
- 0.2-0.5 mL/site is my recommended volume of bupivacaine to instill.
- 2 mg/kg total dose (0.4 mL/kg of 0.5% bupivacaine) is an acceptable dose. At this dose, there is no need to dilute the bupivacaine and there is probably enough volume to permit a repeat of a block if it appears to be patchy or ineffective.
- Follow the nerve blocks with intra-operative injectable carprofen or meloxicam. These can be dispensed as home analgesia for 3 or more days post-

dentistry. Be sure to document effective urine concentrating ability by way of a urinalysis before prescribing NSAID medication to go home with the patient.

- Systemic opioid use in combination with dental nerve blocks may predispose to post-anesthesia agitation or dysphoria after dental extraction surgery, but is appropriate after maxillary surgery.

Note: The above approach to analgesia for oral surgery works well for all procedures except maxillary surgery: maxillary surgery is usually associated with underlying cancer and the surgical site cannot be rendered completely numb with local nerve blocks. So, systemic analgesia is required peri-operatively and extending out a week or more after surgery.

RVT recommends

Do you know a dog or cat with motion sickness? Rumour has it, Elizabethan collars are a drug-free way to nip nasty nausea on car rides.

Do you have a tip to share?
Email it to lisa@oavt.org.



Nancy Brock

Dr. Nancy Brock obtained her DVM degree from the University of Guelph in 1982. She practiced at Picton Animal Hospital until 1984 and the London (Ontario) Emergency Clinic until 1985. She completed a residency in anesthesia and critical care at the University of California, Davis in 1988. In 1995, she became certified as a veterinary anesthesia specialist and is a Diplomate of the American College of Veterinary Anesthesiologists.

Based in Vancouver, BC, Dr. Brock is a regular contributor and consultant for the VIN (Veterinary Anesthesia Network) and is also a clinical instructor at Douglas College's AHT program in Coquitlam, BC. As part of her anesthesia referral practice, Dr Brock provides veterinarians and their nursing staff with anesthesia assistance and expertise via telephone consultation, the in-clinic delivery of anesthesia to high risk or fragile patients and the training of veterinarians and technicians in advanced anesthesia techniques.