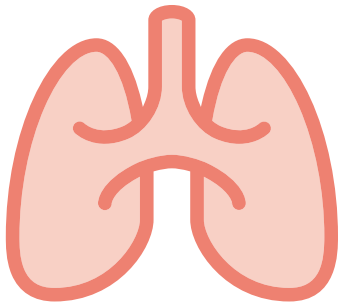


## HOW VETERINARY TEAMS CAN PREVENT

### 6 IATROGENIC ANESTHETIC INJURIES

Nothing is more heart-wrenching than medical mistakes that injure a pet. Anesthetic events are complicated enough. Here are simple ways to prevent common anesthetic-related injuries that will benefit your team and your patients.



#### 1. **INJURY:** *Pulmonary barotrauma*

The phrase “the pop-off valve is closed!” strikes fear in the hearts of any anesthesia team. In as few as 30 seconds, the pressure that builds up inside an anesthetic system can cause damage to a cat’s airway. If more time passes, the lungs of dogs and cats can rupture and collapse, hypoxic brain damage occurs, and death often follows. Other causes of high pressure include improper use of the oxygen flush valve, aggressive ventilator settings, or outflow restriction or obstruction.<sup>1</sup>

#### **PREVENTION:** *Use a high-pressure alarm and an attentive team*

Choose an anesthetic machine and breathing circuit that has safety pop-off relief/occlusion valves, or insert a high-pressure alarm between the common gas outlet and the circuit that will emit a loud noise if the pressure rises.<sup>2</sup> However, nothing is a substitute for a dedicated and well-trained individual monitoring anesthesia.<sup>3</sup>

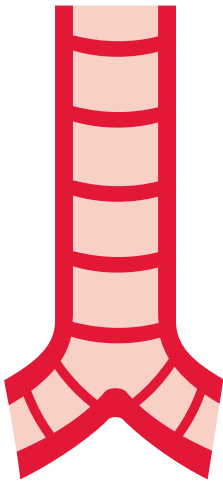
#### 2. **INJURY:** *Blindness*



There is evidence to suggest that the use of spring-loaded mouth gags in cats is a risk factor for cerebral ischemia, which can manifest in post-cortical blindness.<sup>4</sup> When a cat’s mouth is opened as widely as possible, alterations of blood flow to the maxillary arteries—the main source of blood supply to the retinae and the brain—have been consistently reproduced in individual cats.<sup>5</sup> It is thought that the constant force after mouth gag placement can contribute to the compression of the maxillary arteries between the mandible and tympanic bulla.<sup>5</sup>

#### **PREVENTION:** *Prop the mouth open no more than 2-3 cm wide*

Use a laparotomy sponge between the premolars. Or, cut off a syringe cap to be no more than 2–3 cm and insert it between the maxillary and mandibular canine teeth to hold the mouth open slightly. The use of dental mirrors can also assist in visualization of the molars and premolars.<sup>6</sup>



### 3. INJURY: *Tracheal tears*

The airway of companion animals, especially cats, is remarkably fragile. Over-inflation of endotracheal tubes (ETT) can be a devastating cause of tracheal tears, especially if these occur in the intrathoracic trachea or the bronchi.

**PREVENTION:** *Avoid the intrathoracic trachea and handle the entire pet gently*

Premeasure ETTs to go no farther than the tip of the shoulder or thoracic inlet. Use a sterile, water-soluble lubricant on the cuff, which will enhance the airway seal. Inflate the cuff using 0.5-ml increments of air until no leak can be heard when the rebreathing bag is squeezed to a pressure of 16–18 cmH<sub>2</sub>O.<sup>2</sup> Handle the patient gently because tracheal tears can occur due to improper turning of the patient, even if the cuff is properly inflated.<sup>7</sup>



### 4. INJURY: *Airway occlusion*

Inappropriate handling during repositioning of the patient can cause the ETT to kink and occlude air flow.

**PREVENTION:** *Disconnect the ETT prior to repositioning the pet*

Before dramatically repositioning the patient (e.g., from left to right lateral recumbency), the anesthetic tubing should be disconnected from the ETT, and the patient repositioned gently by two staff members, keeping the patient's feet under his body while being turned. Care should be taken to avoid flexion of the neck, which could cause airway occlusion. The tubing can then be reconnected.<sup>8</sup>



### 5. INJURY: *Aspiration*

Any anesthetized patient is at risk for aspiration, but dental patients have an even higher risk, not only from regurgitation of stomach contents, but also from the water, debris, blood, saliva, and the solutions used during periodontal therapy.

**PREVENTION:** *Vigilant airway management, regardless of fasting times*

Contrary to traditional thinking, long fasting times of 10–12 hours do not ensure a dog or cat's stomach will be empty nor that the risk of gastroesophageal reflux (GER) is eliminated.<sup>9</sup> The amount of gastric contents remaining, the gastric and esophageal pH, and the risks of GER can be affected by not only fasting time but also the type of food last fed, pre-medication, induction agents, patient positioning, species, age, and comorbidities.<sup>3, 9, 10</sup> The veterinary team should clearly communicate the desired fasting time for each patient and the suspected risk for GER.

Prior to the procedure, confirm how long the pet has been fasted and what type of food was last fed. Always be prepared for perioperative vomiting or GER, and carefully monitor during all phases of the anesthetic event. Meticulously place the ETT, and immediately alert the team if gastric contents are noted in the oral or nasal cavity or near the pet after extubation.

## 6. INJURY: *Thermal burns*

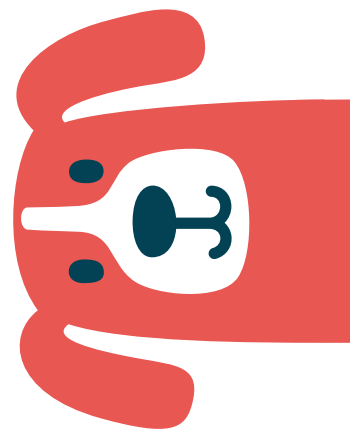
Few injuries are as devastating to a patient, client, or veterinary team than a thermal burn caused by inappropriate heat support in an anesthetized pet.

### PREVENTION: *Use medical-grade warming systems*

Do not use electric heating pads that are not manufactured specifically for companion animal use. Instead, choose safer, active-warming approaches, such as forced warm-air systems, medical-grade electric and circulating warm-water blankets, warm IV fluids, and/or a fluid line warmer. Secondary passive warming—bubble wrap, blankets, and towels—can also be used like insulation on the patient's feet.<sup>2</sup>



A few simple shifts in your team's actions before, during, and after anesthesia can help prevent injury and heartache. Learn more about the **2019 AAHA Dental Care Guidelines for Dogs and Cats** and find valuable materials and resources for your staff and clients at [aaha.org/dentistry](http://aaha.org/dentistry).



#### REFERENCES:

1. Rezende, Marlís. "Pulmonary Barotrauma & Pneumothorax During Anesthesia." *Clinician's Brief* Jul 2018: 68-71
2. Robertson, Sheilah et al. "AAFP Feline Anesthesia Guidelines." *Journal of Feline Medicine and Surgery* 2018; 20: 602-634.
3. Bednarski, Richard et al. "AAHA Anesthesia Guidelines for Dogs and Cats." *Journal of the American Animal Hospital Association* 2011; 47: 377-385.
4. Stiles, J et al. "Post-anesthetic cortical blindness in cats: twenty cases." *The Veterinary Journal* 2012; 193(2): 367-373.
5. Barton-Lamb, AL et al. "Evaluation of maxillary arterial blood flow in anesthetized cats with the mouth closed and open." *The Veterinary Journal* 2013; 196(3): 325-331.
6. Reiter, Alexander. "Open wide: Blindness in cats after the use of mouth gags." *The Veterinary Journal* 2014; 201(1): 5-6.
7. Mitchell, SL et al. "Tracheal rupture associated with intubation in cats: 20 cases (1996-1998)." *Journal of the American Veterinary Medical Association* May 15 2000; 216 (10): 1592-1595.
8. Johnson, Kelli. "Preventing Iatrogenic Tracheal Trauma." *VetFolio* 2007. Obtained January 2019 from <http://www.vetfolio.com/emergency-medicine/preventing-iatrogenic-tracheal-trauma>.
9. Savvas, Ioannis et al. "A 'Light Meal' Three Hours Preoperatively Decreases the Incidence of Gastro-Esophageal Reflux in Dogs." *Journal of the American Animal Hospital Association* 2016; 52(6): 357-363.
10. Savvas, Ioannis et al. "The effect of pre-anaesthetic fasting time and type of food on gastric content volume and acidity in dogs." *Veterinary Anaesthesia and Analgesia* 2009; 36 (6): 539-546.