

companion animal update

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Anesthetic Considerations for High-Risk Patients

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As with any medical procedure, performing anesthesia carries risks. While anesthetic risk for veterinary patients remains higher than in people, a recent study of 150,000 dogs undergoing sedation and general anesthesia at primary care facilities in the United Kingdom reported an overall mortality risk of just 0.1%.¹ Young, healthy patients undergoing elective neutering had a mortality risk of only 0.01% whereas certain breeds, aged animals with co-morbidities, and those undergoing emergency procedures demonstrated increased anesthetic risk.¹ Discussing these risks with owners and taking steps to minimize negative effects are critical to ensuring successful patient outcomes.



Perform a thorough pre-anesthetic evaluation and risk assessment.

It is essential to fully assess an animal before formulating an anesthetic protocol. First, identify co-morbidities with a thorough history, including medications and supplements. Then, perform a complete physical examination and diagnostic testing for a comprehensive understanding of the patient's health status.² Common co-morbidities in older animals include cardiac disease, endocrinopathies, renal and hepatic disease, decline in mentation, and osteoarthritis. Awareness of co-morbidities allows you to anticipate potential complications—and implement preventative and supportive measures to minimize them.

Individualize the anesthetic protocol.

Develop an anesthetic protocol tailored to the individual patient. For example, compromised dogs (e.g., with splenic bleed or GDV) benefit from drugs and anesthetic techniques that are associated with less cardiovascular depression, such as opioid-based protocols. Conversely, anxious cats may require oral sedation at home in addition to injectable drugs (at the practice) to facilitate handling.

Adjust drug administration dosages.

It also is advisable to adjust the drug route and dose based on the patient's status.³ For example, to minimize respiratory depression and possible airway compromise, administer a lower dose of intramuscular sedative drugs

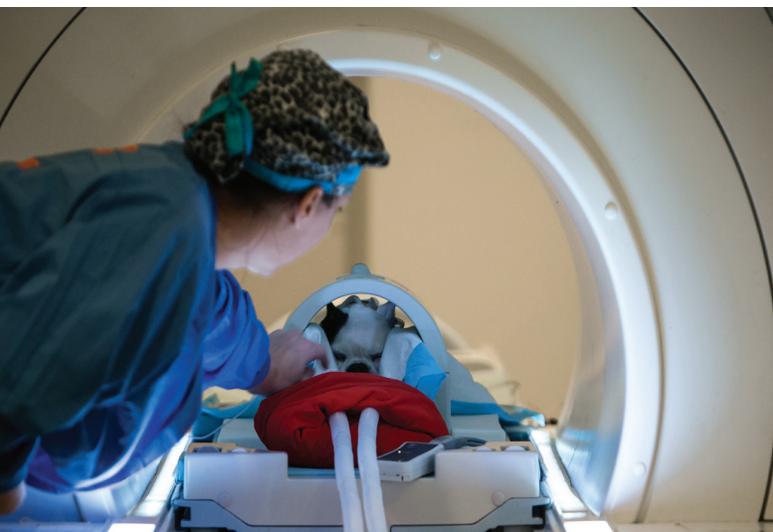
with brachycephalic animals. Similarly, animals with reduced cardiac output typically require a lower dosage than healthy animals, so drugs should be carefully titrated to the desired endpoint (e.g., intubation). Note that the time to onset and peak effect may also be delayed. It is also important to know which drugs may not be ideal in animals with specific diseases, such as acepromazine in a dog with hepatic failure (where effects may be prolonged) or hemorrhage (where vasodilation will contribute further to hypotension). In older cats, renal function is often reduced, and drugs that are primarily cleared by the kidney (e.g., gabapentin, ketamine) may have prolonged effects.

Select and set up equipment.

Start by selecting the appropriate size and type of breathing circuit—and leak test it prior to use. Next, ensure you have functional soda lime (circle system) and a filled vaporizer. Then, consider other equipment based on the patient's needs. For example, consider a forced-air warmer or other active warming equipment with patients that are prone to hypothermia. Use a fluid pump or pediatric drip set (60 drops/ml) to regulate fluid administration with patients prone to fluid overload, such as small dogs with mitral valve disease.

Monitor the patient.

Early recognition of drug-, disease-, and procedure-related adverse effects makes it easier to respond promptly and effectively. The CPR literature suggests that survival-to-discharge rates are much higher (47% vs. 2%) for animals that suffered cardiopulmonary arrest while being monitored during anesthesia compared to non-anesthetized patients.⁴ Anesthetic depth, heart rate and rhythm, indirect blood pressure, arterial oxygen saturation, ventilation, and body temperature should be monitored continuously.⁵ In critically ill patients or those undergoing complex procedures, also consider measuring direct blood pressure, arterial blood gases, acid-base and electrolytes, PCV, and TP. More importantly, it is essential to have a trained individual dedicated to monitoring and supporting the animal.



Provide appropriate support during anesthesia.

Intravenous fluids via an IV catheter and temperature support are standard support for animals under anesthesia. Additional support may be provided by ventilators and drugs to raise blood pressure (e.g., dopamine, dobutamine), other medications (e.g., dextrose for a hypoglycemic kitten, insulin for a hyperglycemic diabetic dog), or natural blood products or synthetic colloids for a procedure where blood loss is anticipated.

Monitor and provide support during recovery.

Continue supportive care and monitoring during the recovery period, especially for high-risk animals. For brachycephalic patients, it is advisable to have additional anesthesia induction drugs and an intubation kit. For an animal with clinically significant mitral valve disease at higher risk of developing pulmonary edema, be sure to monitor respiratory rate and oxygen saturation. In an animal with renal disease, continue fluids and observe urination.

Manage pain and dysphoria.

Even though they may not be considered high-risk, older dogs and cats often have orthopedic co-morbidities, and positioning them for surgery or diagnostics can exacerbate their discomfort. In some circumstances, NSAIDs used to manage their chronic conditions may also have been discontinued prior to anesthesia. In these instances, provide analgesic medications and techniques (e.g., locoregional blocks) to ensure the animal's comfort. Older animals may also have inappropriate mentation that is exacerbated by anesthesia medications. If dysphoria manifests in recovery, consider a partial reversal of benzodiazepines or opioids or whether health-status-appropriate sedatives should be administered.⁶

Keep a detailed anesthetic record.

A detailed, contemporaneous anesthetic record provides evidence of the veterinary team's standard of care. It also documents



the team's recognition and treatment of any complications that arise. Physiological parameters (recorded at five-minute intervals), supportive care, complications, and interventions should be clearly documented in the anesthetic record.

Be ready for an emergency.

In addition to standard anesthesia equipment, keep a well-stocked emergency cart with a defibrillator close to the treatment and recovery areas. Guidelines for managing cardiopulmonary arrest as well as training resources can be found at recoverinitiative.org.⁷

Know your limitations.

When in doubt, reach out to a diplomate of the American College of Veterinary Anesthesia and Analgesia (acvaa.org) for guidance with an appropriate anesthetic plan. As with other specialized procedures, consider referral for anesthesia management.

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Pop-off valve error leads to death

A 7-month-old Yorkshire Terrier presented for a spay. Pre-operative examination and bloodwork were found to be within normal limits. Intra-op, the puppy wasn't breathing well on her own, so manual ventilation was provided. As Dr. B was nearing the end of the procedure, the patient went into cardiopulmonary arrest. Resuscitation efforts were unsuccessful. Upon learning of the loss of the puppy, the client demanded reimbursement for the purchase price of the animal. Dr. B filed a claim with the insurance carrier. During the claim review process, Dr. B disclosed that they discovered that the pop-off valve had been closed. Dr. B agreed that the issue with the pop-off valve was due to staff medical error and fell below the standard of care. Dr. B consented to settle the claim, and the client received \$2,000, the replacement cost of the animal.

Anesthesia Closed Claims

COHAT procedure blamed for cat's demise

A 10-year-old MN DLH with a history of renal failure presented for oral pain. Dr. A determined that a COHAT was needed and met with the client to discuss the risks of anesthesia given the underlying medical condition as well as precautions that would be taken to support the kidneys. Pre-op labwork confirmed unchanged previously diagnosed IRIS Stage 2 CKD. Intravenous fluids were administered throughout the day of the procedure, and Dr. A selected an anesthetic protocol based on the underlying renal disease. After extracting multiple retained tooth roots, Dr. A discharged the cat with a long-acting opioid for pain control. The patient initially improved but acutely declined three weeks later, developing end-stage renal disease, and was euthanized. The client demanded a refund for the COHAT, stating that it worsened the cat's renal disease and contributed to his death. Dr. A declined to refund the client and submitted a claim to the insurance carrier in case the client pursued any further action. After review, the carrier determined that Dr. A met the standard of care by taking the necessary precautions to support the kidneys and informing the client of the risks associated with anesthesia given the patient's medical history. The owner did not pursue their demand, and the claim was closed.

Boxer puppy passes during surgery

An 8-week-old male Boxer was anesthetized with injectable drugs for an ear crop procedure. While Dr. C was performing surgery on the second ear, the technician noticed that the patient became cyanotic. Cardiopulmonary arrest was confirmed, and CPR was performed without success. The client hired an attorney who alleged that Dr. C was negligent, stating that the patient was not intubated and was not adequately monitored. Dr. C filed a claim with the insurance carrier. The carrier determined that the claim would be difficult to defend as Dr. C's medical records did not contain documentation of anesthesia monitoring, verifying that vital signs were monitored and stable while the puppy was anesthetized. Intubation is also considered a best practice, especially in patients considered to be a higher anesthetic risk. Dr. C consented to settle the claim, and their malpractice policy paid \$3,500, the replacement cost of the puppy.

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